Frank Reize

Leaving Unemployment for Self-Employment

An Empirical Study

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and 64 Tables

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For Sabine, Phil and Linda

Preface

This doctoral dissertation, submitted to the University of Mannheim, was written during my employment as a research fellow at the Zentrum für Europäische Wirtschaftsforschung (ZEW – Centre for European Economic Research) in Mannheim. My work profited very much from the fruitful environment provided by the ZEW and particularly by the Department of Labour Markets, Human Resources and Social Policy.

I am very grateful to my advisor, Professor Wolfgang Franz, for his support and inspiration. I am also indebted to Friedhelm Pfeiffer for encouraging me to work on the topic of transition from unemployment to self-employment. Also, Part III of this study gained very much from the joint work with Friedhelm Pfeiffer. Furthermore, I am much obliged to Professor Josef Brüderl for evaluating this dissertation.

I would like to thank the "Förderverein Wissenschaft und Praxis am Zentrum für Europäische Wirtschaftsforschung e.V." for financial support of part of this study.

My work also benefited from the comments and the help of numerous people other than those mentioned above. Knowing that the list of acknowledgement is incomplete, I would like to thank Professor François Laisney and Matthias Almus for their valuable comments on the selection models, Professor William Greene for his helpful remarks on the bivariate probit model, Professor John Ham and an anonymous referee for their very valuable comments on preliminary work of this study, and Joachim Keller, Jens Kohlberger and Yibo Ren for providing excellent research assistance. Obviously, all remaining errors are my own responsibility.

Finally, I would mostly like to thank my family for supporting me during the time this work was completed.

Frankfurt am Main, November 2003 Frank Reize

Contents

Part I

Facts, Institutional Arrangements and Evaluation Strategies

1 Overview and Introduction

During the last two decades, which were characterised by a high rate of unemployment, new instruments of active labour market policy have become popular. Beside the classical programmes like vocational training or re-education, many industrialised countries introduced programmes to promote the transition from unemployment to self-employment (see Franz, 2003 for an overview on trends in, and causes of unemployment and on active labour market programmes). In the view of most politicians, a higher rate of self-employment is promising innovation and growth for the economy. Therefore, politics try to establish a "new culture" of self-employment to open up new sources of employment which in turn shall help to reduce unemployment. The aim is to reduce unemployment directly by shifting people out of an unemployed status into self-employment as well as indirectly by creating further jobs in the newly-founded firms.

In Germany, the transition from unemployment to self-employment is supported by the Federal Employment Services (Bundesanstalt für Arbeit) by what is known as bridging allowance (Überbrückungsgeld). Bridging allowance was introduced on January 1, 1986. In August 1994, the conditions for receiving bridging allowance were considerably eased, which led to a sharp increase in the number of persons who were subsidised. As a consequence, the number of bridging allowance recipients rose from 13,000 in 1991 to almost 100,000 in 1998. Thus, the formerly unemployed accounted for about one fifth of all the new self-employed people. Between the years of 1991 and 2000, in total 640,000 unemployed entered self-employment. In the year 2000, the expenditure for bridging allowance was about 1.5 billion DM.[1]

Thus, bridging allowance is in an ambiguous position between the typical active labour market policies which follow the aim of regaining employment for the unemployed and the typical start-up subsidies which aim to help new (innovative) entrepreneurs to overcome liquidity constraints. This ambiguous position of bridging allowance often has provoked critique by several institutions providing firm subsidisation. The main point of critique comes from the fact that start-up subsidies are assigned by an institution, namely the Federal Employment Services, which does not have the know-how in the field of start-up subsidisation. Part of the critique seems to be justified, but nevertheless, due to the way bridging allowance is arranged – as a subsidy to earn the living during the early phase of entrepreneurship – it has (by legal means) the character of an active labour market pol-

[1] In this study all amounts of money are in DM instead of € as the period of analysis ends in the year 2000.

icy (see Section 2.3). However, one has to admit that economically this subsidy can be viewed as an additional capital endowment, too.

In the context of this study, bridging allowance is evaluated in its function as an active labour market policy.[2] Hence, the analysis addresses the questions "How successful is bridging allowance in creating a stable employment opportunity for the previously unemployed?" and "Does bridging allowance help to reduce unemployment by additional job creation by the newly founded firms?". These two questions cover the explicitly formulated aims of bridging allowance: the regain of employment for the unemployed and the additional job creation by the newly founded firms. Even if this programme is evaluated as an active labour market policy its ambiguous nature is still present. Consequently, the evaluation of bridging allowance includes the individual as well as the firm level.

Econometric analyses in the area of transition from unemployment to self-employment have been rather scarce to date (see e.g. Benus et al., 1994, Bryson and White, 1996, O'Leary, 1998). There are many more studies for the evaluation of other active labour market policies such as training or wage subsidies (for an overview see Heckman et al., 1999 and for an analysis of active labour market programmes in Germany see Lechner, 1999, Hagen and Steiner, 2000 or Lechner and Pfeiffer, 2001). The fundamental problem of every programme evaluation is that one would like to compare the labour market outcome of a programme participant with the labour market outcome of the same participant, if he or she had not participated in the programme. This counterfactual case, however, is never observable. To assess this problem, an adequate control group has to be found for the group of participants (treatment group). Such a control group has to share the same characteristics as the treatment group before participation takes place, but must not benefit from the programme. In terms of bridging allowance, this is given e.g. by those unemployed who enter paid-employment instead of self-employment.

Difficulties in the analysis mostly arise from the fact that the group of participants is selective. In this case the (naive) control group of non-participants is not an adequate control group. As a consequence suitable econometric models have to be employed.

Due to an insufficient data availability, some studies might even suffer from a lack of any control group for the group of subsidised companies or persons. An example is Wießner (2001) where he analyses the employment status and income situation of the unemployed subsidised with bridging allowance three years after transition. Preliminary work to this study by Pfeiffer and Reize (2000a,b) and Reize (2000, 2001a) firstly analysed bridging allowance based on a control group also taking into account selectivity effects.

As stated above the ambiguous nature of bridging allowance needs an analysis to be carried out at the individual as well as at the firm level. Therefore, this study

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[2] Other forms of public firm promotion apart from bridging allowance (e.g. the programmes of the Deutsche Ausgleichsbank) are not taken into account. Almus (2002) provides an extensive discussion of the impacts of start-up subsidies on firm success. His results show mainly positive effects for the start-up programmes he analysed.

is divided into two main parts. The first part deals with the topic of transition from unemployment to self-employment at the individual level, whereas the second part compares the success of subsidised to non-subsidised start-ups at the firm level.

To assess the impacts of bridging allowance at the individual level, this study addresses three questions. First: Who are the unemployed entering self-employment? Second: How successful is self-employment out of unemployment in terms of job stability and income? Third: Is the success of self-employment affected by the grant of bridging allowance? The database for addressing these questions are the first 16 waves of the German Socio-Economic Panel (GSOEP) covering the years from 1983 to 1998. The advantages of the GSOEP are its longitudinal nature as well as the monthly collected information about the employment status, which allows the identification of the transition from unemployment to other employment states. By means of this information, I am able to compare the transition from unemployment to self-employment with the transition from unemployment to paid-employment.

The analysis at the individual level is carried out in two steps. In the first step, the determinants of self-employment are estimated.[3] This can be done in two ways. One possibility is to model the decision to become self-employed within the framework of utility maximisation and another one is to model unemployment duration based on search theory. To the best of my knowledge, neither theoretical work on the decision for self-employment nor on unemployment duration has combined these two labour market states so far. The former work mostly ignores the status of unemployment, solely modelling the transition from paid-employment to self-employment and the latter mostly ignores the possibility of moving into self-employment. There are some exceptions in empirical economics, e.g. Addison and Portugal (1999), Bryson and White (1996), Carrasco (1999) and Böheim and Taylor (2000). The present study tries to combine both approaches, albeit the focus is on the search theory. Consequently, a discrete hazard rate model is used to estimate transitions from unemployment to self-employment and paid-employment as competing risks. Furthermore, an individual, non-parametrically modelled, effect to control for unobserved population heterogeneity and time-varying characteristics, which are important according to both theories, are included in the estimation.

In the second step, the success of self-employment is estimated using the same framework of discrete hazard rate models. Unfortunately, the GSOEP does not provide any information on bridging allowance. Therefore, it is impossible to estimate the effect of bridging allowance on employment stability or income directly. However, this shortcoming is mitigated in two ways. Firstly, given the institutional arrangements it is very unlikely that an unemployed moves into self-employment without promotion (see Section 2.3). Secondly, it is possible to identify the effects of several legal changes of bridging allowance since 1986 on the success of self-employment.

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[3] See Pfeiffer (1994) for an extensive study on the determinants of self-employment in Germany.

Hence, the focus of this study is to compare transitions from unemployment to self-employment with transitions from unemployment to paid-employment in terms of the risk of becoming unemployed again. This analysis is done, taking into account the characteristics of the self-employed, i.e. addressing potential sample selection problems. Besides, the third question, concerning the effects of bridging allowance, is addressed within the analysis of the impacts of legal changes of that programme.

In the second main part of this study the effects of bridging allowance are analysed at the firm level. In this context, firm success is measured in terms of firm survival and employment growth. Such an analysis can fundamentally be carried out from either a labour market economics perspective, or an industrial economics one. From a labour market economics point of view, the focus is on the person and his or her occupational alternatives.

The path to self-employment, whether with or without governmental support, competes with the return to a dependent employment relationship, if available. This is investigated in the literature on the determinants of self-employment (see e.g. Pfeiffer and Pohlmeier, 1992). In this kind of literature, typically the roles of risk aversion, human capital, family networks, liquidity constraints, etc. are used to explain occupational choice. On the other hand, an industrial economics approach would make the market entry and the subsequent firm development the central points of what is being observed. Determinants for this are, among others, capital intensity, returns to scale and market entry barriers created by enterprises already active in the market (see e.g. Audretsch, 1995).

The two perspectives can be integrated. Therefore, at least from a labour economic view there is some overlapping between the analysis at the firm level and the analysis at the individual level. However, both parts are still differentiated in this study as the focus at the individual level is on the search model.

In the econometric analysis of the second part, the development of new enterprises started by the unemployed is compared with other (non-subsidised) starts-ups. In order to do this, a regional sample from data taken from the ZEW (Centre for European Economic Research) Firm Start-Up Panel is combined with information on the bridging allowance recipients of the years 1994 and 1995 held by the Federal Employment Services. The industrial and labour market economics approaches are integrated using firm-specific and personal characteristics of the founder as well as those of any shareholders.

As firms subsidised with bridging allowance are presumably selective, simultaneous models are used to avoid the potential selectivity bias. In order to evaluate the impact of bridging allowance on the respective firms, a model is estimated which simultaneously explains firm survival and firm foundation via bridging allowance. Further, the effect on employment growth can only be estimated in the sample taken from the surviving and thus potentially more successful companies. Therefore a trivariate simultaneous model of firm foundation via bridging allowance, firm survival and employment growth is estimated.

The study is structured as follows. It mainly consists of four parts. Part I includes, beside the Introduction, Chapter 2 to Chapter 4. Chapter 2 discusses trends in unemployment, self-employment and bridging allowance and tries to link these

three topics. Furthermore, this chapter describes and discusses bridging allowance in its function as an active labour market policy. Previous empirical studies on bridging allowance in particular, as well as on the transitions from unemployment and self-employment in general, are presented in Chapter 3. Finally, Chapter 4 provides an overview on the most frequently used econometric models of programme evaluation. Furthermore, possible strategies for the evaluation of bridging allowance are discussed, whereas the ambiguous nature of bridging allowance, between the individual and firm level, is taken into account.

Part II of the study deals with the evaluation of bridging allowance at the individual level. It is divided into two chapters: an introductory chapter and a main chapter containing the empirical analysis. Thus, Chapter 5 provides a brief discussion on the theoretical framework. The focus of this chapter is on the search model. However, theoretical considerations on occupational choice as well as on the push- and pull-hypothesis are incorporated into the search model. Nevertheless, the intention of this chapter is to provide a motivation for the econometric modelling rather than to develop a new theoretical framework. Chapter 6 contains the econometric analysis of bridging allowance at the individual level. This chapter is divided in several sections. First, the econometric theory of discrete hazard rate models with non-parametrically modelled unobserved heterogeneity is discussed, followed by the presentation of the data. Finally, the estimation results regarding the determinants of self-employment, the stability of self-employment, and income are discussed.

Part III of this study provides the evaluation of bridging allowance at the firm level. Its structure is similar to Part II. Chapter 7 presents some introductory remarks, discussing the theoretical framework of firm start-up briefly. Though there is some overlapping with Chapter 5, the focus of this chapter is on the decision to start a firm, whereas in Chapter 5 the unemployed and his or her search for a job is in the centre of the discussion. Chapter 8 contains the econometric analysis, starting with the derivation of the econometric modelling of the simultaneous bivariate probit model and the fully simultaneous selection model with a bivariate probit selection rule. The next section provides the description of the data followed by the discussion of the econometric results for firm survival and employment growth.

The study concludes with Part IV (Chapter 9), containing a proposal for political options and future research.

2 Unemployment, Self-Employment and Bridging Allowance

2.1 Trends in Unemployment and Self-Employment in Germany

In Germany, the last two decades have been characterised by a high and increasing number of unemployed people (see Figure 1).[4] The number of unemployed rose sharply three times. The first increase was in the mid-1970s after the first oil price shock. At the beginning of the 1980s due to several reasons, among them the second oil price shock, the number of unemployed people again increased from around 900,000 to about 2.3 million. During the 1980s the unemployment rate remained fairly stable, it even decreased slowly. After the reunification in 1990 the unemployment rate for West Germany decreased significantly but came back to its previous level during the recession of 1992/93. The total number of unemployed increased sharply after the reunification. Hence, the eastern parts accounted for approximately 1.1 to 1.3 million of the unemployed. The number of unemployed reached its peak in 1997 with nearly 4.5 million people, whereas over 3 million lived in the old federal states.

In the view of most politicians, a higher rate of self-employment is promising innovation and growth for the economy.[5] Therefore, politics try to establish a "new culture" of self-employment to open up new sources of employment which

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4 There are several definitions for the number of unemployed and the unemployment rate, respectively (see e.g. Franz, 2003). In the following the definition of the Federal Employment Services (Bundesanstalt für Arbeit) is used except for international comparisons where the OECD definition is employed. According to the Federal Employment Services a person is regarded as unemployed if he or she is registered as unemployed. Then, the unemployment rate is defined as the ratio of the number of unemployed and the number of dependent employees. In contrast, the OECD definition regards someone as unemployed if he or she is seeking and being available for a job, no matter whether he or she is registered as unemployed or not. The OECD unemployment rate is defined with the number of employed people as the denominator.

5 A self-employed person is defined as a person in work, who is running a business as owner, co-owner or tenant on his own responsibility and not subjected to instructions and who is responsible for the development and outcome of the business (see Pfeiffer, 1994). Similar definitions are employed by the surveys of the Micro-census and the German Socio-Economic Panel (see Section 6.4.1). It should be well noted that the economic definition may vary from the legal definition (see Section 2.2.2).

in turn shall help to reduce unemployment. In fact, not only the number of unemployed people has increased since 1980, but also the number of self-employed people (see Figure 1).[6] After a steady decline until the early 1980s the number of self-employed rose again from 2.3 million to over 3.6 million in the year 2000. This equals a self-employment rate of 10%. Only part of the increase is due to the reunification in 1990. In the year 2000 570,000 of the self-employed people lived in the new federal states excluding Berlin. But nevertheless, the steady increase in the number of the self-employed definitely did not compensate for the large number of layoffs, particularly in the manufacturing sector. Hence, at a first point, a higher rate of self-employment can only contribute to a small degree in solving the problem of unemployment.

Figure 1: Trends in Unemployment and Self-Employment in Germany

Notes: (i) Federal Statistical Office, Time-Series Service. (ii) 1966 to 1990 West Germany, 1991 to 2000 West and East Germany.

For the new federal states the rising number the self-employed reflects the transformation process after the German reunification in 1990.[7] Nevertheless the self-employment rates in East Germany are still lower than those for the western parts (see Table 1). The highest rates can be found in the city-states of Berlin and Hamburg with 12.3%. Among the territorial states, Bavaria has the highest self-employment rate with 11.6%. The lowest rate for a western state, is found for Bremen. However, this rate is even as high as the highest which can be found for

6 See Pfeiffer (1994) for an extensive discussion on trends in self-employment for Germany and in the international context. See also Reize (2002) for an analysis of the determinants of self-employment in Europe.

7 The self-employment rate in the former GDR was extremely low at around 2% (Pfeiffer, 1994).

the eastern states of Brandenburg and Saxony. Saxony-Anhalt has the lowest self-employment rate with 6.6%.

Table 1: Unemployment and Self-Employment Rates in Germany for the Year 2000

	Self-employment rate	Unemployment rate
Germany	10.0	9.6
Baden-Württemberg	9.8	5.4
Bavaria	11.6	5.5
Berlin	12.3	15.8
Brandenburg	9.0	17.0
Bremen	9.0	13.0
Hamburg	12.3	8.9
Hesse	10.6	7.3
Mecklenburg-Vorpommern	7.5	17.8
Lower Saxony	9.7	9.3
North-Rhine Westphalia	9.2	9.2
Rhineland-Palatinate	10.1	7.3
Saarland	9.2	9.8
Saxony	9.0	17.0
Saxony-Anhalt	6.6	20.2
Schleswig-Holstein	11.0	8.5
Thuringia	8.1	15.4

Notes: (i) Federal Statistical Office, Statistical Yearbook (2001). (ii) Self-employment rates including the agricultural sector.

Regarding the unemployment rates the heterogeneity between the federal states is even higher. In general the unemployment rates for the West German states are lower than for the East German states, whereas the lowest unemployment rate is found in Baden-Württemberg with 5.4% and the highest in Saxony-Anhalt with 20.2%. A correlation between the unemployment and self-employment rate is not obvious, despite the difference between East and West.

Compared to other industrialised countries the German self-employment rate is rather small (see Figure 2). In Belgium, Ireland and the United Kingdom the self-employment rate of the non-agricultural sector is well above 10%. In Italy, Portugal and Spain even around one fifth of the labour force is self-employed. The highest self-employment rate with 27% is found in Greece. The United States face a relatively low self-employment rate of 7%, which is approximately the German level of the late 1980s. Only the self-employment rate of Denmark lies below the U.S. rate.

The international comparison of self-employment rates is always difficult, due to different definitions and data availability. In general the self-employment rates reflect different levels of the economic development. In less industrialised countries self-employment rates are in general higher than in more industrialised countries. Thus, in less industrialised countries the sectors of retail trade and craft

works are less concentrated than in more industrialised countries, which will lead to a higher self-employment rate. Good examples are Italy or Spain.

Figure 2: Unemployment and Self-Employment Rates for Selected OECD Countries for the Year 2000

Notes: (i) OECD Employment Outlook 2000; OECD main indicators, March 2002. (ii) Self-employment rates of the non-agricultural sector. (iii) Self-employment rates for Greece and Portugal for the year 1997. (iv) Unemployment rate for Greece for the year 1998.

Therefore, on the basis of international comparisons, a desired rate of self-employment for Germany cannot be derived. Moreover, the rate of self-employment does not seem to be, as in the view of many politicians, an indicator of the economic performance of a country. Thus, countries like Greece, Italy or Spain not only have a high self-employment but also a high unemployment rate. And other countries with low self-employment rates like Denmark, the Netherlands or the U.S. also have very low unemployment rates (see Figure 2).

2.2 Causes of the Trends

2.2.1 Unemployment

In the economic literature there is a wide range of theories analysing the causes of unemployment. However, the political discussion on this topic is, in general, led by an eye-catching wording. The most prominent example are the terms of "structural" unemployment and "cyclical" unemployment (see Franz, 2003: 373). In the following the causes of the trends in unemployment will be briefly discussed using the framework of a theoretical model which can be regarded as a

model of consensus, if there is any, in labour economics: the concept of the "quasi-equilibrium rate of unemployment" (QUERU) and its extension to the concept of the "Non-Accelerating Inflation Rate of Unemployment" (NAIRU).[8]

The QUERU framework is characterised by a situation of underemployment in the labour market equilibrium. Hence, the equilibrium is determined not only by labour supply and demand, but also by particular institutional regulations (e.g. the unemployment insurance scheme) and the wage setting procedures. These regulations and procedures are, despite the situation of underemployment, rational in an economic sense. Furthermore, the model allows for an increase of the QUERU over time due to a country's poorer position in the international competition of locations, a more generous unemployment insurance or an increasing mismatch. Beside, deviations of the actual unemployment rate from the QUERU are modelled as supply and demand shocks, like a shortage in the aggregate demand or increased import prices. These deviations may have long lasting effects which affect the QUERU itself (hysteresis).

In accordance with the framework of the QUERU, a situation of high and increasing unemployment can be a result of the following process: Fluctuations in aggregate demand, as a consequence of structural changes, can lead to a reduction of production, as the adjustment of the production prices by the firms is slow due to incomplete information and adjustment costs. A similar slow process of adjustment is found for the labour market. As a consequence of that process, the unemployed face lower chances to became re-employed the longer the unemployment duration is. This leads to a persistence of unemployment.

To analyse the impacts of the wage policy, demand and supply shocks, wage rigidities, hysteresis and mismatch on the trends in unemployment for the German case the QUERU framework is slightly extended by the inclusion of the inflation rate. This is done within the framework of the NAIRU. Within the NAIRU concept the unemployment rate in the equilibrium co-ordinates the claims of bargaining unions and firms to the gross national product in a way that the inflation rate is constant at a tolerable or warranted level, i.e. 2% in accordance with the European Central Bank. In contrast to the QUERU model, the NAIRU is also characterised by the equity as well as the constancy of the inflation and wage growth rate. Hence, different economic situations can be described by deviations of the actual unemployment rate from the NAIRU equilibrium. Therefore, we can distinguish between situations where the actual unemployment rate is higher than the NAIRU, which could be the result of an aggregate demand shortage, where the two rates are equal or where the actual rate is lower than the NAIRU, which would lead to an increased inflation rate and probably being fought by a restrictive demand management. Furthermore, the concept of the NAIRU illustrates that a reduction of unemployment below the level of the NAIRU has to go along with the reduction of the NAIRU itself, i.e. the economic policy has to deal with the determinants of the NAIRU.

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8 For a detailed discussion of the QUERU model see e.g. Calmfors and Holmlund (2000), Franz (1996) or Lindbeck (1993). A detailed description of the NAIRU model can be found at e.g. Landmann and Jerger (1999) or Franz (2003).

To illustrate the impact of aggregate supply shocks on the unemployment rate assume rising import prices (e.g. the oil price), which will result in an increased NAIRU. As a consequence the actual unemployment rate falls below the NAIRU and the inflation rate tends to increase. Therefore, two options are present: first, the wages have to decrease, i.e. the claim of the unions to the gross product has to be reduced; or second, a restrictive demand management by government has to be installed.

Another phenomenon that can be modelled within the NAIRU framework is the hysteresis phenomenon. In such a case the NAIRU also depends on the unemployment rate of previous periods. Again, think of an oil price shock which increases the unemployment rate. Hysteresis is present if after the shock the unemployment rate does not decrease to the original level. This may happen due to discouraged unemployed or firms which use the signal of unemployment as a screening instrument. If persistence of unemployment is present an expansionary demand policy would not only reduce the actual unemployment rate but also the NAIRU.

Finally, a mismatch between the profile (regional and/or regarding the qualification) of the job seekers and the vacant jobs will limit the possibilities of an expansionary policy to reduce unemployment, as the NAIRU increases with an increased mismatch. In such a case active labour market policies may help to reduce the mismatch.

Based on the theoretical background of the NAIRU, the trends in unemployment for Germany during the last decades can be explained as follows.[9] From the 1960s to 1973 the NAIRU was on average only around 1%. This extremely low value can be explained by some very special circumstances: Firstly, the high progress in productivity, secondly, the low exchange rate of the DM, and thirdly, the fact that the excess demand for labour was compensated by immigration and not by rising wages, which would have led to a rising NAIRU.

Between 1975 and 1981 two oil price shocks led to a rise of the NAIRU. The impact of the rising oil prices where reinforced by a slowdown of the productivity growth and a higher exchange rate of the DM. However, the main reason for the increased NAIRU to a level of around 4% was the large increase in nominal wages (up to 10% (!) between 1974 and 1975) to compensate for the reduced real wages. As the actual unemployment rate was only 0.3 percentage points above the NAIRU there was no room for an expansionary policy. The increase of the unemployment rate between 1979 and 1981 was primarily due to an aggregate demand shortage caused by a restrictive fiscal and monetary policy because of a budget deficit.

Since 1983 the NAIRU has been 9% on average, which is about the same as for the actual unemployment rate. The main reason for the increase of the NAIRU is the increase of long-term unemployment, i.e. the phenomenon of hysteresis. During the 1980s almost all job gains were compensated by a growing labour force. However, the economic boom in 1988/89 showed that an excess demand in the labour market can reduce even long-term unemployment and therefore bring the

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[9] See Franz (2003) for a more detailed discussion.

NAIRU back to a level of 6%. The phenomenon of hysteresis has been diminished for West Germany during the 1990s. For the year 1998 Franz (2001) estimated a NAIRU of 8%, which is about 1.4 percentage points under the actual unemployment rate for West Germany. Therefore, the increase in unemployment during the 1990s was mainly caused by malfunctional labour markets, mostly on the supply side, rather than by cyclical movements. Examples are high wages, mismatch and the restrictive institutional framework.

For the sharply increasing and still high rate of unemployment in East Germany, mainly three different causes are discussed.[10] First, many employees in the former GDR were employed only for reasons of the political system. Second, the production in the former GDR did not (or hardly did) match the preferences of the people. Hence, after the re-unification goods were imported from the western parts of Germany and moreover the eastern firms lost their markets in the Comecon states. Third, the exchange rate of 1:1 after the re-unification increased the product wage by four times. Moreover, in the following years the wage policy did not contribute to the reduction of the unit labour costs in East Germany. In the year 2000 the unit labour costs were still 11.3% above those in West Germany (see Franz, 2003).

2.2.2 Self-Employment

In economic literature several causes for the rise of self-employment and the self-employment rate, respectively, are discussed (see e.g. Audretsch, 1995, Meager, 1993 or Pfeiffer, 1994). According to this literature the decrease until the 1980s and part of the increase in the number of self-employed people in the 1990s was caused by an extensive structural change. Hence, the shrinking agricultural and the expanding manufacturing sector reduced the number of self-employed until the mid-1980s. In contrast, the extensive structural change from the manufacturing-based economy towards information and communication technologies (ICT) since the 1990s heavily increased the number of self-employed in relatively short time. In general, firm size is smaller in the service sector than in the manufacturing sector. Hence, the expansion of the service sector also led to a higher rate of self-employment. Most industries of the rapidly increasing knowledge intensive services face higher self-employment rates than on average.[11] In those industries the self-employment rate increased from 13.3% in 1991 to 16.5% in 1997. In comparison the general self-employment rate was around 10% during this decade (see Reize, 2001b).

Furthermore, the opportunities offered by ICT also contributed to a reduction of the optimal firm size in other sectors than the knowledge intensive services, particularly in the manufacturing sector. This fact facilitated the transitions into self-employment. Accordingly, the self-employment rate in the manufacturing sectors

[10] See Franz (1993) for a detailed discussion.

[11] See also the OECD Employment Outlook (2000) for an extensive discussion of trends in self-employment in the international context.

also climbed up from 6.4% in 1991 to 8% in 1997 (see Reize, 2001b). Finally, outsourcing and the privatisation of parts of the public services opened up an opportunity for more people to become self-employed. This opportunity applies especially to the high-skilled, which are more often employed in the public sector than the other skill groups.

Another reason for the increased self-employment rate lies in the changes in the demographic and socio-economic structure of the labour force. Thus, the labour force participation of women rose during the last decades. This fact as well as a higher general education and a higher average age of the labour force favoured transitions into self-employment.

Moreover, a topic of the political and public discussion is the question whether traditional work done by dependent employees has been outsourced to free-lancers or self-employed without additional employees, just to omit payments for the social securities, the so-called phenomenon of quasi-self-employment. However, the total amount of quasi-self-employment is hard to quantify, as it depends on the legal definition of self-employment and dependent employment, respectively, rather than on the economic one (see Section 2.1).[12] Unfortunately, the legal definition changed several times during the 1990s[13], leading to the phenomenon of self-employed people switching to quasi-self-employment without changing their economic activities. An empirical analysis of the Institute for Employment Research in Nuremberg (IAB) estimated a number of 182,000 quasi-self-employed for the year 1994 (see Dietrich, 1996, 1998, and 1999).

Finally, one of the main causes for the increased number of self-employed people, at least during the 1990s, was the rise of the number of unemployed people. In accordance with the push-pull-hypothesis[14], an unemployed may be pushed into self-employment because of the lack of opportunities in getting a job as a paid worker. Estimations for West Germany for the year 1995 showed that an increase in the amount of the unemployed by 1% would have led to an increase in the number of firm start-ups by 5.7%, which equals 3,075 additional start-ups caused by 25,000 additional unemployed (see Pfeiffer and Reize, 1999a). For East Germany an additional inflow of 18,000 unemployed people would have resulted in an increase of the number of self-employed by 5,100. Hence, the impact of unemployment as a push-factor for the number of self-employed people, not at least is a

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12 There are several concepts to differentiate between employment and self-employment: "subjection to instructions", "entrepreneurial risk", "liability to pay contributions to the social insurance" (see Dietrich, 1998). Since January 1, 1999, a person is viewed as a dependent employee rather than self-employed if three of five legal criteria are met: e.g. the business is run without additional employees for which contributions to the social securities are paid, there is only one regular and permanent customer, and the customer has these jobs carried out also by employees (see Berndt, 2000).

13 Until 1998 there was no legal regulation. The Federal Labour Court used the terminus of "subjected to instructions" to define dependent employment. See also footnote above.

14 See e.g. Meager, 1993 or Chapter 5 for more details.

consequence of an extensive subsidisation of transitions from unemployment to self-employment with the so-called bridging allowance (Überbrückungsgeld).

Figure 3: Trends in Bridging Allowance

Notes: (i) Official Bulletin of the Federal Employment Services (ANBA), several issues, Wießner (1998). (ii) 1983 to 1990 only West Germany, 1991 to 1998 Germany.

As a reaction to the high and increasing number of unemployed people in Germany during the last two decades new instruments of active labour market policy have become popular. Beside the classical programmes like training or re-education, most industrialised countries introduced programmes which promote transitions from unemployment to self-employment.[15] In Germany, an extensive increase in the subsidisation with bridging allowance led to a rising number of self-employed people in the 1990s. Between 1991 and 2000 640,000 unemployed were promoted with bridging allowance (see Figure 3). On this occasion, the figures of programme participants rose from 13,000 in 1991 to almost 100,000 in 1998, corresponding to about one fifth of all the new self-employed people.[16] The aim of bridging allowance is to reduce unemployment, directly by re-employment and indirectly by additional job creation of the newly established firms. In 2000

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[15] Beside Germany, several other industrialised countries introduced similar programmes to promote transitions from unemployment to self-employment. These countries are: Australia, Belgium, Canada, Denmark, Finland, France, Greece, Great Britain, Ireland, Luxembourg, the Netherlands, Norway, Portugal, Sweden and the United States (OECD, 1995).

[16] This figure is based on own calculation with the German Socio-Economic Panel. See Pannenberg (1998) for similar numbers obtained on the same database or Wießner (2001) for results on the calculations of the Institut für Mittelstandsforschung, Bonn.

the expenditure on bridging allowance was nearly 1.5 billion DM for 92,604 unemployed (see Figure 3 and Table 3 in the next Section).

The strong influence of bridging allowance on the number as well as on the structure of the self-employment can also be seen from the fact that between 1993 and 1997 the share of self-employed people without further employees grew above average, from 44 to 48%. Firm start-ups by the unemployed are in general smaller than those by previously employed (see Chapter 8).

2.3 Bridging Allowance as an Active Labour Market Programme

2.3.1 Institutional Arrangements and Adjustments

The transition from unemployment to self-employment is subsidised as part of active labour market policies in Germany. In order to allow and facilitate this transition, the Federal Employment Services *may*[17] pay what is known as a bridging allowance (Überbrückungsgeld) according to §57 of the 3rd Social Security Code (SGB III).[18] The bridging allowance was first introduced with the 7th amendment to the Labour Promotion Law (AFG) on January 1, 1986. Since then, bridging allowance has been facing several legal changes, when periods of more liberal use were followed by periods of rather restrictive use and vice versa (see Table 2).[19]

Nevertheless, these periods have certain communities. Firstly, the applicant for bridging allowance has to be registered as unemployed for at least one month and has to have received unemployment benefits or relief.[20] Secondly, the activity has to consist of at least 15 hours a week. A competent authority has to assess the sustainability of the self-employment envisaged. Such an authority can be a chamber of commerce and industry, a trade or professional association, a credit institute, a tax or management consultant or a lawyer specialised in business law. As a rule, it is the task of the unemployed to achieve the assessment which ensures that the business earns, in time, a gross monthly income that represents at least two thirds of the income of an employed person. The aim is to prevent promotion of

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[17] There is no legal right to the payment of bridging allowance (in accordance with the 3rd Social Security Code). In fact the payment as well as the amount of payment are subjected to a discretionary decision of the legal labour market office.

[18] Until January 1, 1998, the legal foundation was §55a of the Labour Promotion Law (AFG).

[19] For a more detailed discussion on the legal regulations of bridging allowance, see Kaiser and Otto (1990), Brinkmann and Otto (1996), and Wießner (1998, 2001).

[20] Since 1993 also people threatened by unemployment, i.e. workers with reduced hours and employees who have participated in work creation measures according to §§260 ff. SGB III and §91 to 96 AFG or measures according to §249h and §242s AFG (lump sum wage subsidies) are eligible for subsidisation with bridging allowance. The latter measures support the reintegration of unemployed people by financing environmental protection, social and youth work, especially in East Germany.

the politically disputed category of quasi-self-employment (see Section 2.2.2) and of start-ups which are badly prepared.

In general the payment of bridging allowance follows the amount of the previous paid unemployment assistance. The payments also include the contributions to the public pension scheme as well as to the unemployment, health and since 1998, also to the nursing insurance, equal to the social security contributions which were last paid for the unemployed person. In addition to solely paying bridging allowance, some regional labour market offices offer additional training and preparation courses e.g. the Bureau of Start-Ups (Büro für Existenzgründungen) in Munich.

The main tools of adjustment for bridging allowance are the required duration of unemployment, the duration of promotion and the amount of promotion. In a first period, from January 1986 to July 1987, bridging allowance was not restricted; i.e. every unemployed person registered for at least ten weeks was promoted for 13 weeks with the amount of the last paid unemployed assistance. During this period, the regulations were slightly eased, so that the required minimum duration of unemployment was reduced to four weeks and promotion extended to 26 weeks. From August 1988 to July 1994, bridging allowance was employed restrictively, because public funds were limited to a certain amount. The duration of promotion varied between 8 and 26 weeks and depended on the duration of unemployment. The maximum grant was paid only if unemployment lasted more than 12 and up to 18 months. The amount of promotion was also restricted to a maximum between 300 and 350 DM per week. Finally, not all unemployed willing to become self-employed and fulfilling the legal requirements were promoted. This was mainly the case at the end of a year when the public funds were exhausted.

The introduction of the Employment Promotion Law (Beschäftigungsförderungsgesetz) on August 1, 1994 represents the most recent legal change of bridging allowance, implicating a considerable improvement in terms of promotion. Since August 1994, bridging allowance has generally been granted to people unemployed for at least four weeks. Promotion duration is in general 26 weeks and amounts to the lastly paid unemployed assistance. In addition, during the time of support the contributions to health and nursing insurance, as well as to the retirement fund, are financed in an amount equal to the social security contributions which were last paid for the unemployed person. As a consequence of the eased regulations for bridging allowance nearly every unemployed who is willing to enter self-employment is able to be promoted.[21] Thus, the assessment of sustainability does not seem to be a very high hurdle, as the unemployed is free in the choice of the assessing institution. As a consequence, almost all self-employed coming from unemployment are subsidised with bridging allowance.

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21 In 1997 the regional labour offices were authorised to restrict the amount as well as the duration of payment if the funds were not sufficient. On August 1, 1999 bridging allowance was slightly extended. Since then bridging allowance is also paid if the self-employment does not immediately start after the exhaustion of the entitlement to the unemployment benefits (see Wießner, 2001)

Table 2: Legal Arrangements and Adjustments of Bridging Allowance

Period of Time	Unemployment Duration	Hours p. Week	Income (gross)	Take-Overs	Promotion Duration	Promotion Amount (DM)	Target Group	Grant was
1.1.86-31.12.87	10 weeks	19	1000	Yes	13 weeks	UE-benefits	Unemployed	Unrestricted
1.1.88-30.7.88	4 weeks	19	1000	Yes	6 months	UE-benefits	Unemployed	Unrestricted
1.8.88-30.10.88	Up to 3 months 3 to 6 months Over 6 months	19	3400	No relatives	13 weeks 18 weeks 26 weeks	Max 350 per week	Unemployed	Restricted
1.11.88-31.12.88					No Promotion			Restricted
1.1.89-31.5.89	Up to 3 months 3 to 9 months 9 to 12 months Over 12 months	19	3400	No relatives	8 weeks 13 weeks 18 weeks 26 weeks	Max 320 per week	Unemployed	Restricted
1.6.89-31.12.92	Up to 6 months 6 to 12 months 12 to 18 months Over 18 months	19	3400	No relatives	8 weeks 13 weeks 18 weeks 26 weeks	Max 300 per week	Unemployed	Restricted
1.1.93-31.7.94	Up to 6 months 6 to 12 months 12 to 18 months Over 18 months	19	3500	No relatives	8 weeks 13 weeks 18 weeks 26 weeks	Max 300 per week	Unemployed 4 weeks short time work Public works programmes Income support payments	Restricted
1.8.94-2.1.97	4 weeks	18	No	No relatives	6 months	UE-benefits	Unemployed 4 weeks short time work Public works programmes Income support payments	Unrestricted
Since 3.1.97	4 weeks (flexible)	15	No	No	6 months (down to 1 month)	UE-benefits	Unemployed 4 weeks short time work Public works programmes Income support payments	Restricted

Source: Kaiser and Otto (1990), Brinkmann and Otto (1996), Wießner (1998, 2001) and 3rd Social Security Code (SGB III).

In 2000, the financial expenditure supporting the transition from unemployment to self-employment amounted to an average of approximately 15,800 DM per unemployed person (see Table 3), which is almost three times more than in 1986. After 1994, the growing unemployment and the improvement in terms of promotion led to a significant raise in the grant of bridging allowance, from 25,835 cases in 1993 to almost 100,000 cases in 1998, and thus also to an increase in total expenditures.[22] The rising number of self-employed people out of unemployment also affected the total number of self-employed persons (see the previous Section). During the last decade self-employment in Germany has grown considerably from about 3 million to almost 3.6 million (see Table 3 or Figure 3 in the previous Section). Nearly one fifth of the new self-employed were formerly unemployed.

Table 3: Self-Employment, Unemployment and Bridging Allowances from 1983 to 2000

Year	Number of self-employed (millions)	Number of un-employed (millions)	Subsidised unemployed	Amount (millions DM)	Amount per recipient
1983	2.324	2.258	-	-	-
1984	2.430	2.266	-	-	-
1985	2.424	2.304	-	-	-
1986	2.403	2.228	5,576	25.5	4,572
1987	2.426	2.229	10,069	51.6	5,121
1988	2.422	2.242	17,949	180.7	10,065
1989	2.663	2.038	11,013	62.4	5,668
1990	2.830	2.123	12,742	54.6	4,288
1991	3.037	2.602	13,014	90.3	6,935
1992	3.091	2.979	31,587	136.4	4,318
1993	3.175	3.419	25,835	98.5	3,812
1994	3.288	3.698	37,297	194.8	5,224
1995	3.336	3.612	70,634	822.0	11,638
1996	3.409	3.965	89,744	1,063.0	11,845
1997	3.528	4.385	78,824	944.0	11,976
1998	3.594	4.279	98,296	1,247.4	12,690
1999	3.594	4.099	98,114	1,486.0	15,146
2000	3.643	3.889	92,604	1,467.6	15,848

Notes: (i) Federal Statistical Office, Time-Series Service; Official Bulletin of the Federal Employment Services (ANBA), several issues; Wießner (1998); own calculations. (ii) 1983 to 1990 West Germany, 1991 to 1998 West and East Germany.

2.3.2 Aim and Potential Impacts

The aim of the programme of bridging allowance is to shift people out of an unemployed status into self-employment, and therefore to reduce the level of unem-

[22] However, the importance of bridging allowance is relatively low compared to training measures. In 1996, the expenditure for active labour market policy amounted to 41.2 billion DM altogether. One billion DM was spent on bridging allowance compared to almost 18 billion DM spent on training measures.

ployment. Beside the direct effect of unemployment reduction bridging allowance also aims to reduce unemployment indirectly by creating further jobs in the newly-founded firms. Hence, bridging allowance has (wants) to be seen as an active labour market programme. This view is confirmed by the fact that bridging allowance is paid to support the living in the early phase of the start-up, rather than increasing the capital endowment of the firm. Accordingly, bridging allowance can be granted together with other start-up subsidisation e.g. the "Startgeld" of the Deutsche Ausgleichsbank (DtA), which is intended to improve the capitalisation of the firm.[23] About 14% of the bridging allowance recipients also receive a subsidisation by the DtA (see Struck, 1998). Nevertheless, there is sometimes a dispute about the competence of start-up promotion by the labour market offices between the institutions promoting start-ups and the Federal Employment Services.

In accordance with the terms of the promotion, an unemployed person does not lose his or her right to unemployment payments or assistance by a transition to self-employment.[24] Thus, even with very low expected revenues, the transition to self-employment seems to be attractive for economic reasons, at least in the short run and for people facing poor prospects as wageworkers or slack labour markets. This corresponds to recent work in sociology providing that groups which are possibly discriminated in labour markets are more likely to become self-employed (see e.g. Meyer, 1990 or Fairly and Meyer, 1999). An explanation for such behaviour is that the disadvantages faced by these groups reduce wage earnings relatively more than they reduce self-employment earnings. Therefore, the disadvantaged tend to select themselves into self-employment. The estimation of the determinants of self-employment among former unemployed can show if self-employment is the last chance of an unemployed to get re-employed or if it is chosen by those who are better qualified, have higher financial endowment or social networks.[25] The latter is usually the case among paid workers moving into self-employment.

Moreover, the grant of bridging allowance may have a positive effect on the probability of becoming self-employed due to higher capital endowment and lowered capital constraints. Although bridging allowance is granted to support the living in the early phase of the start-up, this promotion actually acts as an additional capital endowment, in particular if one regards the average amount of subsidisation (see Table 3). Therefore, an unemployed person subsidised with bridg-

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23 Start-ups are promoted in Germany by over 100 programmes and much more local initiatives. The two quantitatively most important programmes are the bridging allowances scheme and the loan programmes for start-ups from the DtA. The DtA supported more than 45,000 start-ups in 1997 (Struck, 1998).

24 The legal entitlement to unemployment benefits lasts for four years from the beginning of the entitlement period. Therefore, a bridging allowance recipient has the opportunity to receive unemployment benefits again. E.g. if the first entitlement period of unemployment benefits lasted one year, followed by a half year of subsidisation with bridging allowance, then the formerly unemployed has the opportunity to receive unemployment benefits during the next 2.5 years.

25 See Chapter 6 for more details on the determinants of self-employment.

ing allowance might not have to rely on credits anymore. Consequently, bridging allowance might enable more unemployed people to enter self-employment as it would be the case without that programme. On the contrary, bridging allowance can also yield dead-weight effects, if an unemployed person would have moved into self-employment without subsidisation, too. An even worse impact of bridging allowance would be the increase of (short-term) unemployment. Hence, it is likely that dependent workers, who are already willing to start a business, become unemployed in order to get bridging allowance. However, bridging allowance is not paid if the employment was intentionally terminated to become self-employed, but this intention is hardly verifiable by the labour office agent.

Beside the impact on the determinants of self-employment, the form of promotion also has some impact on the success of self-employment. However, these effects may have different implications. On the one hand, higher capital endowment improves the chances of surviving and growing for the start-up. On the other hand, due to the fact that an unemployed does not lose his or her right to unemployment benefits, bridging allowance extends the entitlement period by six months. Insofar, opportunistic behaviour cannot be excluded, i.e. an unemployed person may enter self-employment just to receive unemployment benefits for half a year longer, instead of seeking a stable employment opportunity. Such behaviour may reduce the success of self-employment compared to paid-employment as well as compared to start-ups by previously employed people. Hence, one should have these opposite impacts in mind when interpreting the effects of bridging allowance.

To measure these impacts of bridging allowance on the success of self-employment the analysis is split into two parts. In the first part bridging allowance is analysed from the individual point of view, i.e. the determinants and the success of self-employment out of unemployment is compared to the determinants and success of a paid job. In the second part bridging allowance is analysed from the firm perspective. Hence, start-ups subsidised with bridging allowance are compared to start-ups without this subsidisation in terms of survival and employment growth.

3 Previous Empirical Findings on the Transition from Unemployment to Self-Employment

3.1 Analysis of Bridging Allowance

In order to obtain results on both the use and success of bridging allowance, the Institute for Employment Research in Nuremberg (IAB) carried out several descriptive analyses on recipients of bridging allowance. The first sample contained people who received bridging allowance between 1986 and 1988 (see Kaiser and Otto, 1990). The aim was to determine the influence of legislative changes on the granting of bridging allowance, the tendency to become unemployed again after the subsidisation and the socio-demographic structure of the bridging allowance recipients.

The second survey on bridging allowance began in 1994. The IAB obtained a full census of the bridging allowance recipients during 1994/95 in 15 selected labour market districts (§55a-sample).[26] The 4,486 unemployed receiving bridging allowance can be subdivided into "old cases" (bridging allowance in the 1st/2nd quarter of 1994 before the promotion terms were improved on August 1, 1994) and "new cases" (4th quarter 1994, 1st/2nd quarter 1995). The focus of the analysis was on the differences in the socio-economic structure of the recipients of payments. 38 weeks after the start-up, 5.4% were again registered as unemployed; after 78 weeks, this figure rose to 6.9%. The study could not find any differences between old and new cases (see Brinkmann and Otto, 1996).

A third survey is also based on the §55a-sample of the years 1994/95. In summer 1997, those bridging allowance recipients were interviewed again. The main focus of this survey was on the occupational mobility and the development of the start-up in terms of employment growth and survival. Three years after the start-up 70.4% were still self-employed, 12% were working in an employment relationship that was subject to social security payments and approximately 13% were registered as unemployed (see Wießner, 1998). During the same period each bridging allowance recipient employed on average 0.54 additional persons for whom he had to pay contributions to the social security. Wießner (2001) analyses the determinants of firm success using the same database. He shows that in particular married men between 30 and 55 years of age with higher capital endowment as well as with higher subsidies with bridging allowance face a higher chance of establishing a successful business. Furthermore, experience in the occu-

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26 This sample was also used for the analysis in this study, see Chapter 8.

pation where the firm is established also improves the success of the start-up. However, most of the determinants of success he is testing prove to be insignificant (see also Wießner 2000).[27]

So far, an econometric analysis to measure the impact of bridging allowance on labour market or firm success using a control group has been done within preliminary work to this study. Pfeiffer and Reize (2000a,b) and Reize (2001a) analyse the impacts of bridging allowance on firm survival and firm growth using firm data and comparing start-ups subsidised with bridging allowance with non-subsidised start-ups. Pfeiffer and Reize (2000b) find a negative effect of bridging allowance on firm survival and no significant differences in firm growth for East Germany. For West Germany, there are no significant differences neither in firm survival nor in firm growth between the two groups of firms. These analyses were extended for the present study in two different ways: A more advanced econometric model and an extended firm history (see Chapter 8 for more details).

Reize (2000) analyses the impacts of bridging allowance at the individual level. Within the framework of discrete hazard rate models the determinants and the success of self-employment out of unemployment are compared to the alternative of a paid job. Again, this analysis represents the basic work for the present study and being extended by the use of a more advanced econometric model and a longer period of time.

3.2 Further Empirical Findings

To the best of my knowledge, general econometric analyses on the transition from unemployment to self-employment for Germany do not exist to date.[28] For other countries than Germany, studies regarding those transitions have been rather scarce to date.[29]

Earle and Sakova (2000) compare the determinants of self-employment, paid-employment and unemployment in six transition economies (Bulgaria, Czech Republic, Hungary, Poland, Russia and Slovakia) in the year 1993. They find that own-account workers and employers differ in certain characteristics, e.g. schooling. Whereas a higher degree of schooling improves the probability of being an employer it reduces the probability of being an own-account worker. However, for characteristics such as marital status or receipt of property both groups of self-employment are closer to each other than compared to the state of self-employ-

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27 Albeit the analysis of determinants is done within a multivariate logit model, the estimation has more or less the character of a descriptive analysis rather than of a causal one. The most crucial point is that Wießner (2001) only tests subsets of certain determinants in different models.

28 An exception might be the work of Welter (2000) which analysis start-ups from unemployment and micro-financing of these firms based on case studies.

29 Meager (1996) presents an overview on the evaluation of labour market policies which subsidise transitions form unemployment to self-employment. However, his results are more or less of descriptive nature.

ment. Finally, own-account workers have a similar family background to the unemployed.

O'Leary (1998) evaluated self-employment promotion among the unemployed in Hungary and Poland by comparing those unemployed subsidised by the programme with other unemployed people for the mid-1990s. He finds that many of those receiving self-employment assistance probably would have gained reemployment without government assistance. However, the analysis also shows that the participants face a longer employment duration as well as, at least in Poland, higher earnings than the control group. In both countries start-ups by the unemployed create between 0.31 and 0.83 additional jobs.

Lin et al. (2000) show for Canada that around 30% of the newly self-employed in 1994 came from unemployment. However, this figure is much lower than for the entrants into paid-employment of whom over 47% were unemployed one month before. Unfortunately, neither for entries into nor for exits from self-employment the variable previous unemployment is tested in the regressions.

For the United States, Benus et al. (1994) investigate the effect of governmental start-up promotion based on a social experiment. The study refers to pilot programmes in the states of Washington and Massachusetts, respectively, for the years of 1990 and 1991. The analysis reveals some interesting findings. First, participants are more likely to enter self-employment than their counterparts which were not eligible. Second, participants are more likely to remain longer self-employed compared to the unemployed control group. Third, in Massachusetts the earnings of the participants are higher than for the controls.

Also for the U.S., Evans and Leighton (1989, 1990) analyse the probability of being self-employed including a dummy variable indicating unemployment. They find that the unemployed are more likely to become self-employed than the formerly paid-employed. Moreover, they obtain the result that the formerly unemployed who enter self-employment have lower earnings than those entering paid-employment do. Thus, white males face earnings that are 34.4% lower than the ones of their previous jobs if entering self-employment but 3.0% higher if entering wage work. Evans and Leighton (1990) also compare the determinants of self-employment among the unemployed and paid-employed. They find similar results for both groups, e.g. that a higher educational degree favours the transition to self-employment. Besides, they claim that unemployment duration has no effect on the probability of entering self-employment.

In contrast, Alba-Ramirez (1994) obtains a positive effect of unemployment duration on the probability of becoming self-employed among Spanish and U.S. workers who recently moved out of non-agricultural wage work. In Spain, unemployment duration has also a positive effect on the possibility of choosing a low quality self-employment, e.g. part-time work or holding another job, whereas in the U.S. the former long-term unemployed among the self-employed are more likely to occupy low quality jobs compared to the paid-employed.

Whereas the studies of Evans and Leighton as well as of Alba-Ramirez rely on cross-sectional information on job status and therefore taking unemployment or unemployment duration as exogenous, the study of Carrasco (1999) uses spell information for Spain. Using competing risks discrete hazard rate models she ob-

tains a stronger negative effect of unemployment benefits on transitions from unemployment to self-employment than on transitions from unemployment to paid-employment. She also finds that previous unemployment among the self-employed increases the risk of re-entering unemployment more than the risk of re-entering paid-employment.

The focus of those studies is rather to find empirical evidence for the theory of self-employment as a reaction of discrimination than to compare self-employment and paid-employment among the former unemployed. As a consequence these studies mainly compare self-employment out of unemployment with self-employment out of paid-employment.

Böheim and Taylor (2000) investigate unemployment duration in Britain with the exit state of self-employment. Their estimation results of a competing risks duration model show that men aged 25 or younger have the lowest probability to enter self-employment, which is in sharp contrast to exits in full- and part-time employment. Furthermore, a higher formal qualification as well as previous self-employment experience favour transitions into self-employment, whereas previous unemployment has a negative impact on those transitions. Finally, until the third month of unemployment the probability of entering self-employment increases, followed by a declining rate and again peaking at nine months of unemployment duration.

The most comparable study to my analysis is the report of Bryson and White (1996) for the United Kingdom.[30] They analyse the determinants and the success of self-employment among former unemployed using discrete hazard rate models. Like Evans and Leighton (1990), they find that better labour market histories among all unemployed and higher qualification among unemployed women favour the transition to self-employment. In contrast to previous findings, unemployment duration proves to be insignificant. Moreover, assets and previous self-employment show up to be important determinants of the transition to self-employment. Macroeconomic factors are working in opposite direction for men and women. For men, pull-factors are important for leaving unemployment for self-employment, whereas for women push-factors are dominant. Concerning the stability of self-employment, Bryson and White (1996) find that self-employment is more stable than paid-employment in terms of re-entering unemployment, whereas age has a negative and duration has a positive effect on surviving in self-employment among men. In contrast to Evans and Leighton (1990), they do not find any differences in earnings between the self-employed and the paid-employed among men.

The present study will go beyond previous research. At the individual level discrete hazard rate models are used to estimate the transitions from unemployment to self-employment and the duration in self-employment (see Chapter 6). The model also incorporates unobserved heterogeneity, which affects mainly the influence of time dependence on the transition rate. Neither the work of Bryson and White (1996) nor the one of Carrasco (1999) modelled unobserved heterogeneity.

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[30] For the United Kingdom an overview on the role of micro-finance for transitions from unemployment to self-employment is provided by Metcalf et al. (2000).

At the firm level, econometric analyses in the area of public start-up promotion have been rather scarce to date, in particular for programmes subsidising unemployed firm founders.[31] Brüderl et al. (1996) examine, based on the data of the Munich Founder Study, the effects of governmental start-up subsidies and previous unemployment including a dummy variable. Whereas, previous unemployment has an impact neither on firm survival, nor on employment and sales growth, governmental subsidies improve at least the survival probability. Albeit, this positive effect exists only for the comparison with all non-subsidised firms and diminishes if the comparison only is with firms eligible for the subsidisation.

Almus (2001) analyses the impact of firm subsidisation by the Deutsche Ausgleichsbank (DtA) based on non-parametric matching models as well as based on simultaneous parametric models.[32] He finds positive impacts of subsidisation on firm survival as well as on employment growth. Finally, Battistin et al. (2001) analyse a programme of promoting youth entrepreneurship in Italy. Within the framework of a non-parametric matching model they find the result that subsidised firms only survive longer because of the subsidisation. Hence, if the grants run off, the survival probability for the promoted start-ups is no longer higher than for the non-subsidised start-ups.

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[31] Metcalf and Benson (2000) provide an overview on micro-financing programmes for the United Kingdom. See also footnote above.

[32] Similar parametric models are employed in the present study. See Chapter 8.

4 Evaluation Strategies

4.1 The Sample Selection Bias

The aim of the quantitative analysis of social programmes is to assess the causal impact of the programme on a certain outcome variable. However, this causal impact is never observed in reality. Hence, the fundamental problem of every programme evaluation is that one would like to compare the labour market outcome of a programme participant with the labour market outcome of the same participant, if he or she had *not* participated in the programme. The latter, however, is never observable. The fundamental problem is solved if the participants (treatment group) of a programme and the non-participants (control group) do not differ systematically in their characteristics and behaviour before the programme starts, i.e. in the absence of a sample selection bias. Such a situation is typically built up by a social experiment. In principle, the social experiment is viewed as the best solution of the evaluation problem, however experiments are very expensive (see Heckman and Hotz, 1989) and e.g. in Germany social experiments are not allowed because of ethical reasons. Moreover, Heckman and Smith (1995) show that social experiments also face several selection problems. Since in reality a sample selection bias is present for most social programmes either due to self-selection or due to programme-selection processes a naive comparison of participants and non-participants would not yield the causal impact of the programme. Hence, as an alternative to the experimental method a non-experimental (econometric) procedure is applied to address the sample selection bias. In principle, the econometric procedures assemble the control group ex post out of the pool of non-participants and aim to estimate a hypothetical value of the outcome variable for the treatment group on the basis of that control group.

To study the influence of the sample selection bias on the causal effect in what follows, Y_{it}^{o} represents the success of individual i before programme participation.[33] d stands for the programme participation. $d_i = 0$, if the person has not participated and $d_i = 1$, if he or she has. The expected outcome before programme participation is different for both groups if it is assumed that:

$$E[Y_{it}^{o} \mid d_i = 1] \neq E[Y_{it}^{o} \mid d_i = 0], \tag{4.1}$$

The outcome Y_{it} of person i is given by:

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33 The following discussion heavily draws on Heckman and Hotz (1989).

$$
\begin{aligned}
Y_{it} &= Y_{it}^{o} + d_i \gamma_{it} \quad \text{if k>t} \\
Y_{it} &= Y_{it}^{o} \qquad\qquad \text{if k<t}
\end{aligned}
\tag{4.2}
$$

where γ_{it} represents the causal effect of the programme for individual i in period t, whereas it is assumed that the programme takes place in period k. The aim of the evaluation is to measure the average treatment effect (ATE) for the sample of the participants. Hence, given the case that the impact is the same for all participants ($\gamma_{it} = \gamma_t$), it follows:

$$\gamma_t = E[\gamma_{it} \mid d_i = 1] = E[Y_{it} - Y_{it}^{o} \mid d_i = 1]\,. \tag{4.3}$$

The expected programme success of a treated individual is given by

$$E[Y_{it} \mid d_i = 1] = \gamma_t + E[Y_{it}^{o} \mid d_i = 1]\,, \tag{4.4}$$

and for the controls by

$$E[Y_{it} \mid d_i = 0] = E[Y_{it}^{o} \mid d_i = 0]\,. \tag{4.5}$$

It should be well noted that $E[Y_{it}^{o} \mid d_i = 1]$ in equation (4.4), the so-called counter factual (see Rubin, 1977), is not observable. As the difference between the two expected values one obtains

$$E[Y_{it} \mid d_i = 1] - E[Y_{it} \mid d_i = 0] = \gamma_t + \{E[Y_{it}^{o} \mid d_i = 1] - E[Y_{it}^{o} \mid d_i = 0]\}\,. \tag{4.6}$$

The term in curved brackets {} depicts the sample selection bias. If this term equals zero, there is no difference between treatments and controls before treatment took place and a naive comparison of the measure of success of treatments and controls would yield an unbiased estimate for the causal effect. However, if the treatments and controls are systematically different before programme participation the sample selection bias will not be zero and the naive comparison will not depict the causal effect. As a consequence, to address the sample selection problem econometric methods have to find an adequate estimate of the non-observable counter factual $E[Y_{it}^{o} \mid d_i = 1]$.

In principle, the selection mechanisms can be based on observable and unobservable variables (see Heckman and Hotz, 1989), like e.g. age and motivation. Neglecting such factors can result in inconsistent estimates. To demonstrate this, equation (4.6) is extended as follows:

$$y_{it} = x_{it}' \beta_t + d_i \gamma_t + \varepsilon_{it}\,, \tag{4.7}$$

where y_{it} shall again represent a measure of program success, e.g. income, x_{it} a vector of observable exogenous characteristics, d_i a dummy variable indicating whether a programme took place or not and ε_{it} is assumed to be a normally distributed error term with mean zero and variance σ_{ε}^{2}. In this formulation income of the individual depends on the treatment, other observable factors, and an error term. The equation of being treated is given by:

$$d_i^* = w_i'\delta + u_i \tag{4.8}$$

where d_i^* represents a latent unobservable variable for which the following binary selection rule applies:

$$d_i = 1 \quad if \quad d_i^* > 0$$
$$d_i = 0 \quad otherwise$$

w_i represents the vector of the variables determining the selection into the treatment, while u_i is assumed to be a standard normally distributed error term. The variance-covariance-matrix of the two error terms is given by

$$V = \begin{pmatrix} \varepsilon_i \\ u_i \end{pmatrix} = \begin{pmatrix} \sigma_\varepsilon^2 & \sigma_{\varepsilon u} \\ \sigma_{\varepsilon u} & 1 \end{pmatrix}. \tag{4.9}$$

From this ensues the expected income:

$$E[y_{it} \mid x_{it}, d_i] = x_{it}\beta_t + d_i\gamma_t + E[\varepsilon_{it} \mid x_{it}, d_i]\cdot \tag{4.10}$$

where $E[\varepsilon_{it} \mid x_{it}, d_i]$ corresponds to the term in the curved brackets in equation (4.6). Thus, a selection bias is present if $E[\varepsilon_{it} \mid x_{it}, d_i] \neq 0$, which would be the case if ε_{it} and d_i were not independent, i.e. $\sigma_{\varepsilon u} \neq 0$. According to the above discussion such a dependence can arise either from a dependence between ε_{it} and w_i (e.g. age) or between ε_{it} and u_i (e.g. motivation). Whereas the former corresponds to selection on observables the latter refers on selection on unobservables. Thus, for equation (4.7) the assumptions of the standard regression model (if one assumes y_{it} to be linear) are violated and e.g. ordinary least squares estimation would result in an inconsistent estimation of γ_t.

4.2 Addressing the Sample Selection Bias

There are several econometric methods to address the sample selection bias.[34] In principle, those methods can be divided into two classes: First, there are models assuming that the selection is only based on observable characteristics, those are e.g. the control function estimator, the matching procedure or the instrumental variable estimator, and second, there are models assuming selection being based also on unobservable characteristics, those are e.g. the Heckman procedure or the fixed effects estimator. In the following the control function estimator and the Heckman procedure shall be described in more detail. These two estimators are applied for the empirical estimations of Chapter 6 and Chapter 8. An extensive discussion of the several econometric methods, their advantages, disadvantages,

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[34] See Heckman and Robb (1985), Heckman and Hotz (1989), and Heckman et al. (1999). The experimental method is not further discussed here.

underlying assumptions, requirements on data etc. can be found in Heckman et al. (1999).

4.2.1 The Control Function Estimator

Suppose the presence of outcome equation (4.7) and of selection equation (4.8). Furthermore suppose that the selection is only based on observable characteristics such as age, education gender or marital status, i.e.

$$E[\varepsilon_{it} \mid d_i, x_{it}, w_i] = E[\varepsilon_{it} \mid x_{it}, w_i]\,. \tag{4.11}$$

Equation (4.11) clearly shows that the selection bias is based on the observable variables w_i instead of on the participation decision d_i. Hence, the selection bias can be eliminated if it is possible to control for the observable variables w_i correctly. In this case, ε_{it} would be independent of the participation dummy d_i. In a next step we can build the conditional expectation of equation (4.7), which is given by

$$E[y_{it} \mid d_i, x_{it}, w_i] = x_{it}'\beta_t + d_i\gamma_t + E[\varepsilon_{it} \mid x_{it}, w_i]\,. \tag{4.12}$$

$E[\varepsilon_{it} \mid x_{it}, w_i]$ represents the so-called control function. If one knows the functional form of the control function, $E[\varepsilon_{it} \mid x_{it}, w_i]$ can be inserted into equation (4.7) which will lead to a consistent estimate of γ_t. Such an estimator is called control function estimator (see Heckman and Robb, 1985 or Heckman and Hotz, 1989). To illustrate the application of the control function estimator suppose $E[\varepsilon_{it} \mid x_{it}, w_i]$ to be linear, i.e. suppose a linear control function estimator (see Barnow, Cain, and Goldberger, 1980).[35] Thus, inserting $E[\varepsilon_{it} \mid x_{it}, w_i]$ in (4.7) yields

$$y_{it} = c_{it}'\alpha_t + d_i\gamma_t + \varepsilon_{it} - E[\varepsilon_{it} \mid c_{it}] = c_{it}'\alpha_t + d_i\gamma_t + \tilde{\varepsilon}_{it}, \tag{4.13}$$

where c_{it} represents the vector of all exogenous variables including x_{it} and w_{it}, and α_t is the corresponding coefficient vector. $\tilde{\varepsilon}_{it}$ is defined as the difference of the error term and its conditional expectation. Finally, the conditional expectation of equation (4.13) is given by

$$E[y_{it} \mid c_{it}] = c_{it}'\alpha_t + d_i\gamma_t + E[\varepsilon_{it} \mid c_{it}] - E[\varepsilon_{it} \mid c_{it}] = c_{it}'\alpha_t + d_i\gamma_t\,. \tag{4.14}$$

Hence, an ordinary least squares estimation of equation (4.13) would yield a consistent estimate of the programme impact γ_t. To apply the linear control function estimator a reduced form equation is estimated, i.e. all variables either explaining the outcome measure and/or the selection process are included into the outcome equation.

The assumptions which are required for that procedure are, first, the knowledge of the functional form of the control function and second that selection is solely

[35] The linear control function estimator is applied in Chapter 6.

based on observable characteristics. In empirical practice the latter might be fulfilled if one is able to control for a large number of exogenous variables depicting or approximating also unobservable factors.

The matching procedure (see Rubin, 1977, Rosenbaum and Rubin, 1983, and Lechner, 1998) tries to rebuild the situation of a social experiment. It assembles a control group from the sample of the non-participants and tries to find for every treated, at least, one control with the same characteristics. The advantage of this method is that no assumptions on the distribution or functional form of the error term are required. In principle, the matching procedure resembles the control function estimator, with the exception that no certain functional form for the control function is assumed. Instead, the outcome measure is conditioned on all observable exogenous variables based on non-parametric procedures (see Heckman et al., 1987). The disadvantage of the matching procedure is that in absence of an assumption on the error term all exogenous variables which influence selection as well as the outcome, have to be known. Thus, matching is sensitive in the choice of the exogenous variables. A further disadvantage is the very technical character of the procedure. Like the social experiment only the ATE can be estimated but not the influence of other variables on the outcome variable.[36]

4.2.2 The Heckman Selection Model

In contrast to the previous section, the Heckman selection model also allows for selection based on unobservable characteristics.[37] This procedure was first proposed by Heckman (1976) as a two-step estimator.[38] The starting point is again equation (4.7) and equation (4.8), but in contrast to the previous section, as selection is also based on unobservable characteristics, it follows the condition

$$E[\varepsilon_{it} \mid d_i, x_{it}, w_i] \neq E[\varepsilon_{it} \mid x_{it}, w_i]. \tag{4.15}$$

Hence, controlling for the observable characteristics does not eliminate the sample selection bias, i.e. $\sigma_{\varepsilon u} \neq 0$. As a consequence, the Heckman selection model has to make assumptions on the joint distribution of the error terms. These assumptions can be expressed e.g. in the variance-covariance-matrix of equa-

36 As the instrumental variable estimator has no practical importance for the programme evaluation in Germany, because of a lack of adequate instruments, this procedure will not be further discussed. For an extensive overview on the instrumental variable estimator see Heckman and Robb (1985), Heckman et al. (1999), Imbens and Angrist (1994) or Angrist et al. (1996).

37 Another class of models allowing for selection on unobservables are panel estimators, e.g. the fixed effects estimator of the linear model (see e.g. Heckman and Hotz, 1989 or Heckman et al., 1999). The main pre-condition for the usage of these estimators is the availability of longitudinal data.

38 Recent studies mostly prefer the full information maximum likelihood (FIML) estimator instead of the two-step estimator. For a discussion of the properties of these two estimators see Section 8.1.

tion (4.9). If these assumptions on the joint distribution proof to be false then additional variables explaining the selection process but not the outcome variable, so-called exclusion restrictions, have to be included in the vector w_i to guarantee the identification of the model.

The estimation of the Heckman selection model is carried out using a two-step procedure or a simultaneous procedure. For the purpose of this chapter we will employ the two-step procedure.[39] In the first stage the probability to participate in a programme is estimated using e.g. a probit model. Then, in the second stage the probability of participation is included as an additional variable in the outcome equation. This variable is the so-called inverse of Mill's ratio (IMR). Formally, equation (4.8) is estimated using a probit model. Then the IMR is calculated as

$$\lambda_i = \frac{\phi(w_i\delta)}{\Phi(w_i\delta)} , \qquad (4.16)$$

where ϕ represents the standard normal density and Φ the standard normal distribution. Including the IMR into the outcome equation (4.7) yields

$$y_{it} = x_{it}\beta_t + d_i\gamma + \lambda_i\theta + \upsilon_{it} \qquad (4.17)$$

and the conditional expectation

$$E[y_{it} \mid x_{it}, d_i = 1] = x_{it}\beta_t + d_i\gamma + \lambda_i\theta , \qquad (4.18)$$

where θ represents the coefficient of the IMR and equals $\sigma_{\varepsilon u}$. This conditional expectation can be derived from the following equation[40]

$$\begin{aligned} &E[y_{it} \mid x_{it}, d_i = 1] = E[y_{it} \mid x_{it}, u_i > -w_i\delta] \\ &= x_{it}\beta_t + d_i\gamma + E[\varepsilon_{it} \mid u_i > -w_i\delta] = x_{it}\beta_t + d_i\gamma + \lambda_i\theta . \end{aligned} \qquad (4.19)$$

An ordinary least squares estimation of equation (4.17) would lead to consistent estimates of the coefficients. However, the standard errors would be inconsistent and have to be corrected (see Ronning, 1991). A simultaneous estimation of the Heckman model yields consistent estimates of the standard errors. This procedure is applied in Chapter 8. Thus, the Heckman selection procedure regards the sample selection bias as an omitted variable bias, which is controlled for, by including the IMR in the outcome equation.

The critical assumptions of this model are the knowledge of the joint distribution of the error terms on the one hand and, if this assumption does not hold true, the existence of variables explaining the selection process but being uncorrelated with the outcome measure on the other hand.

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39 The simultaneous estimation is described in Section 8.1. For a derivation of the Heckman selection model see e.g. Greene (1997).

40 For a more detailed description see Ronning (1991).

4.3 Evaluation of Bridging Allowance at the Individual Level and at the Firm Level

The choice of the appropriate selection model seems hardly to be straightforward. Each of the procedures discussed in the previous sections has its own critical assumptions, requirements on the data, advantages and disadvantages. Moreover the evaluation of bridging allowance is somewhat different from typical analysis of active labour market programmes. In contrast to other programmes the participation in the programme, namely becoming self-employed, is already part of the success of the programme, namely leaving unemployment. Hence, beside the nature of the available data, also the special nature of bridging allowance has to be addressed when choosing an adequate evaluation procedure. Furthermore bridging allowance is intended to be evaluated at the individual and at the firm level. Therefore, special characteristics of those two levels have to be regarded for the evaluation of bridging allowance, too.

For the analysis of bridging allowance at the individual level the procedure of the control function estimator is employed (see Chapter 6). The reasons are threefold. First, the usage of the matching procedure seems to be inappropriate because of the question of the analysis, which is closely related to the special nature – the equity of participation and success – of bridging allowance as an active labour market policy. Besides, the question who is entering self-employment, which can also be addressed within the matching procedure, the analysis tries to address the question, which factors are responsible for the success of self-employment. Only one, for sure the most important factor among them, is bridging allowance. The usage of the matching procedure would only yield an expected difference for the risk of becoming unemployed again between the self-employed and an adequate control group (e.g. the paid-employed, see Chapter 6). Hence, for most studies dealing with training programmes the pure treatment effect is a sufficient measure of success. Second, the analysis at the individual level is based on discrete hazard rate models as one measure of success is the risk of re-entering unemployment (see Chapter 6). The inclusion of a selection mechanism based on unobservables is very difficult in this modelling framework (see Kraus et al., 1997). A simultaneous full information maximum likelihood estimation of the selection and the outcome equation would result in a very complex likelihood function, as both endogenous variables are limited dependent variables and the likelihood function does not meet the linear form, i.e. the observations are correlated over time (see Section 6.2).[41] Third, the nature of data (German Socio-Economic Panel), with its rich information on observables characteristics, enables to control for the heterogeneity between treated and controls nearly complete and therefore address selectivity quite well. As a consequence matching would be a possible and promising procedure, especially based on this database. But nevertheless the control function

[41] Lalive et al. (2000) present a method of including selection on unobservables within duration models. However, their application on continuous time duration models is not appropriate to models in discrete time.

estimator seems to be more appropriate than the matching procedure as the focus of the analysis is to address more than the ATE.

For the analysis of bridging allowance at the firm level two major restrictions are present. First, only cross sectional data is available and second, only a few number of attributes explaining programme selection and firm success are available. Therefore, it is very likely that part of the selection process is still unobservable. Thus, neither a matching procedure nor a reduced form control estimator seems to be appropriate. Furthermore, the absence of panel data leaves the Heckman selection model as the only option. Although matching is done within other studies using the same set of data, the ZEW Firm Start-Up Panel (see Almus, 2002), its usage seems to be critical. Chapter 8 shows that the modelling of the selection process is difficult, in the sense of finding adequate variables which explain the heterogeneity between subsided and non-subsidised start-ups. The results show that a good part of the selection remains unobserved, which would not be depicted by a matching procedure. Beside this rather technical reason for the usage of the Heckman selection model, again the ambiguous nature of the programme plays an important role when choosing the appropriate procedure. Evaluation at the firm level is somewhat different from the commonly known evaluations at the individual level. At the individual level the central question of evaluation is: What would be the outcome if the individual did not participate in the programme? What is the counterfactual at the firm level? What would have happened if the firm was not subsidised? Probably, it would not have been founded. Thus, at the firm level there is no adequate control group in the sense of a counterfactual. Therefore, evaluation at the firm level does not measure the causal impact of treatment (subsidisation) but the difference in success of subsidised and non-subsided firms. In this sense, a matching procedure may yield the expected difference between subsidised and non-subsidised firms, if the observable characteristics are sufficient in controlling for the selection bias, but all other factors influencing the success of the firm will remain unknown.

Hence, for the analysis at the individual as well as at the firm level parametrical models are employed. At the individual level I am able to identify the causal impact of bridging allowance, though only indirectly (see Section 6.1). In contrast, at the firm level only the difference in success between subsidised and non-subsided firms, apart from other variables influencing firm success, can be measured.

Part II

From Unemployment to Self-Employment

5 Theoretical Framework – An Extended Search Model

To model transitions from unemployment to self-employment theory provides in principle two guidelines. The first alternative is to model these transitions in the framework of dynamic occupational choice. However, the theoretical work provided by Lucas (1978) and Kihlstrom and Laffont (1979) only models the role of management capabilities, risk preferences and the initial capital endowment for the choice between self-employment and paid-employment, neglecting the state of unemployment. In principle, the state of unemployment could be incorporated in the models of occupational choice, but the focus of the analysis in this study is still the individual unemployment behaviour. The standard approach to model individual unemployment behaviour in empirical labour market economics is the use of hazard rate models (see Devine and Kiefer, 1991).[42] The hazard of leaving unemployment can be interpreted as a reduced standard job-search model (see Steiner, 2001). Therefore, the second alternative, the job-search model, seems to be more appropriate to model transitions from unemployment to self-employment. However, the theory of occupational choice is not completely waived. As the standard search theory does not include the option of self-employment, the basic model is extended by some considerations derived by the theory of occupational choice.[43]

In its simplest form, search theory assumes an unemployed individual, facing a known wage distribution and job offers at a constant arrival rate. Then the individual chooses a reservation wage that maximises the present value of the stream of expected utilities which is a function of leisure and income (see e.g. Mortensen, 1986). The optimal reservation wage is given if the present value of the accepted wage offer equals the present value of further search efforts. More formally, the reservation wage w^R is defined as

$$w^R = \frac{r(u-c) + p(z,w^R)E(w \mid w \geq w^R)}{r + p(z,w^R)}, \tag{5.1}$$

where r denotes the individual discount rate, u the unemployment compensation, c the search costs, p the probability of accepting a wage offer, z the exogenous char-

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42 For comprehensive studies of unemployment duration in Germany, see e.g. Hunt (1995), Steiner (2001) or Wurzel (1993).

43 The models of Lucas (1978), Kihlstrom and Laffont (1979) and others concerning the choice between self- and paid-employment are discussed in more detail in Chapter 7, where the focus of the discussion is on the choice for self-employment and firm start-up, respectively.

acteristics determining p, and w the offered wage.[44] The exogenous factors z which might influence the reservation wage, may comprise e.g. human capital, assets or social background.

From equation (5.1) it can be seen that higher unemployment benefits as well as the conditional expectation of the wage offer have a positive impact on the reservation wage. Conditioned on the assumption that the job offer arrival rate as well as the wage distribution are exogenous, with the determination of w^R also the hazard rate of leaving unemployment and hence the duration of unemployment is determined.

This basic model has to be extended for the analysis in this study, as the unemployed also have the opportunity to enter self-employment. Hence, beside job offers at a constant rate of arrival and a known wage distribution the unemployed is also faced by a constant rate of start-up opportunities with a known distribution of gain from these self-employment opportunities. Moreover, in contrast to the choice of dependent work additional costs may arise for the choice of self-employment. E.g. substantial inputs such as investments in product and production ideas, in human capital, in the establishments of networks with suppliers and customers may be necessary prior to firm foundation. Such transition costs which might have, in part, the characteristics of sunk costs hardly arise for transitions to paid-employment.

For this analysis it is assumed that job offers and self-employment opportunities arrive independently. Therefore, the probability p of accepting an offer can be extended as follows

$$\begin{aligned} p(z,w^R) &= p_{PE}(z,w^R) + p_{SE}(z,w^R) \\ &= \int_{w_{SE}|w_{SE}\geq w^R}^{\infty} q_{PE}(z,w^R) f(w_{PE}) dw_{PE} \quad , \\ &+ \int_{w_{PE}|w_{PE}\geq w^R}^{\infty} q_{SE}(z,w^R) f(w_{SE}) dw_{SE} \\ &= p_{PE}(z,w^R,w_{SE}) + p_{SE}(z,w^R,w_{PE}) \end{aligned} \tag{5.2}$$

where p_{PE} denotes the probability of accepting a wage offer and p_{SE} the probability of accepting a self-employment opportunity. q_j with j = PE, SE stands for the probability of receiving a job offer and f represents the respective wage/gain distribution. A wage offer is accepted if w_{PE}, which is the wage for paid-employment, lies above w^R as well as the offered gain from self-employment w_{SE}.[45] Analogous, an offer for a firm start-up is accepted if w_{SE} is higher than w^R and w_{PE}. Therefore, the crucial extension compared to the basic model is the dependence of the probability of an offer in sector j from the wage in the other sector. Consequently, the reservation wage for the extended model is defined as

$$w^R = \frac{r(u-c) + p_{PE}(z,w^R,w_{SE})E(w_{PE} \mid w_{PE} \geq w^R) + p_{SE}(z,w^R,w_{PE})E(w_{SE} \mid w_{SE} \geq w^R)}{r + p_{PE}(z,w^R,w_{SE}) + p_{SE}(z,w^R,w_{PE})} . \tag{5.3}$$

From equation (5.3) it can be seen that the impact of an increase in the conditional expectation of the wage/gain in either sector on w^R still is positive as well as the

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[44] For the derivation of the reservation wage see e.g. Franz (2003).

[45] w_{SE} is net of (sunk) transition costs.

impact of u. However, compared to the basic model there are two competing risks of leaving unemployment. E.g. an increase in w_{SE} will also increase w^R and therefore reduce unemployment duration but it will also reduce the probability of accepting a wage offer and therefore reducing the hazard to leave unemployment for paid-employment.

Hence, the extended model is able to analyse the transition from unemployment to either self- or paid-employment as competing risks. However, some shortcomings of this model should not be concealed. For specific groups, e.g. long-term unemployed or unskilled, labour demand might be a constraint. In this case, even a reduction of the reservation wage, may not shorten search time, i.e. unemployment duration, as the reservation wage can be bounded by a minimum wage.[46] Furthermore the probability of a successful match after the search process is not discussed at all. Whether there is a successful match depends on the flexibility of the adaptation of the reservation wages and the wage offers. If, in the case of a mismatch the reaction is slow, search duration may be prolonged.[47] However, the problem of a constraint labour demand might be mitigated within this study, as the unemployed has the opportunity to enter (subsidised) self-employment. Certainly, there is still the possibility of a "mismatch" if the unemployed is not at all interested in choosing a self-employed opportunity because of e.g. high risk aversion.

Despite the critique on the job search model, this theory provides empirically testable determinants of the reservation wage and hence of unemployment duration. As discussed above, the higher unemployment benefits are the longer unemployment duration takes. To test the impact of the unemployment compensation system on the hazard of leaving unemployment the concept of the income replacement ratio (IRR) is used. The IRR is defined as the ratio of unemployment assistance and expected income from wage work or self-employment. The concept of the IRR is proposed by several recent studies (e.g. Steiner, 2001).[48] Its assumption is that the individual's decision rather depends on the relative amount of unemployment benefits than on the absolute. According to the search model the hazard of leaving unemployment depends negatively on the IRR.

By the extension of the basic search model also some important factors determining the occupational choice which are discussed by Lucas (1978) and Kihlstrom and Laffont (1979) like risk aversion, wish for independence, management capabilities or the uncertainty of income from self-employment can be incorporated into the hazard rate analysis. Those factors are either included in z (e.g. the wish for independence) or in the wage/gain distribution f (e.g. the uncertainty

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[46] Though, the impact of individual factors like education may be included in the probability of receiving a job offer q, but the occurrence of minimum wages may still prevent q from rising to a level above zero.

[47] See Pissaridis (1990) for an extensive discussion on matching models for the labour market. See also Hosios (1990) for the derivation of the equilibrium outcome of the matching process.

[48] The IRR concept incorporates into the search model the ideas of the traditional labour supply models that occupational choice depends on the relative gain between two alternatives (see e.g. Burtless, 1989).

income). Furthermore, one of the main variables derived from the occupational choice models and explaining the determinants of self-employment is the ratio of expected income from self- and paid-employment, respectively. As shown by equation (5.2) the probability of accepting an offer in paid-employment negatively depends on the wage or income offered by a self-employment opportunity. Although, the impact of a rising gain from self-employment on the reservation wage and hence on unemployment duration is indefinite, the impact on the relative hazard of leaving into a certain state is clear. If the expected income from self-employment compared to the expected income from paid-employment increases the hazard rate of becoming self-employed increases and the hazard rate of becoming paid-employed decreases.

A further extension of the basic search model analyses the impact of unemployment duration itself on the hazard rate. Theory yields no clear picture how unemployment duration affects the probability of finding a job. Negative duration dependence, i.e. the hazard rate from unemployment declines with unemployment duration, may result from the following sources.[49] First, the job offer rate declines with the duration of unemployment.[50] Second, the wage offer distribution shifts to the left. Third, the individual search intensity declines. A lower job offer rate as well as a lower offered wage might be compensated by a reduced reservation wage. However, Mortensen (1986) shows that under fairly general conditions the effect of negative duration dependence dominates. A decline of the search intensity might result from e.g. discouragement effects.

The probability of a positive duration dependence is discussed by Mortensen (1977). If the entitlement to unemployment benefits is restricted to a certain period, then the reservation wage declines and hence the hazard rate increases until the benefit exhaustion date and remain constant thereafter.

Beside these individual characteristics, costs and benefits of self-employment or paid-employment are determined by aggregate economic factors as well. A shift from unemployment to paid-employment might be more likely to occur in a phase of general economic growth, since in such a phase, profit expectations and hiring rates of firms might be higher. However, this might also favour the transition from unemployment to self-employment. Contrarily, a weak labour market can also be a decisive factor for becoming self-employed. In times of increasing unemployment, an unemployed person might be "forced" into self-employment due to the poor prospects of finding a job. In the literature there is a debate about the relevance of unemployment push vs. demand pull factors for company formations (see e.g. Meager, 1992, and Staber and Bögenhold, 1993). Several empirical studies show that both factors may have an influence on transitions to self-employment (see e.g. Blanchflower and Oswald, 1998, Meager, 1992 or Pfeiffer and Reize, 1999a).[51] However, those studies do not yield a clear picture whether demand pull or unemployment push factors are dominant. The impact of growth and unem-

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[49] For a detailed discussion see Mortensen (1986).

[50] In the following the terms of wage and gain as well as paid- and self-employment are treated as synonymous.

[51] For some detailed results of Pfeiffer and Reize (1999a) see also Section 2.2.2.

ployment on the probability of becoming self-employed varies between regions as well as over time.

Finally, the discussion should be briefly drawn on the separation rate, i.e. employment duration. In the empirical estimation not only the hazard of entering self- or paid-employment is modelled but also the hazard of leaving these states again. To model employment duration in a dependent job in principle two theories are available: the matching theory and the human capital theory. The matching models assume that the firm is uncertain over the real productivity of the employee on the specific job (see Mortensen, 1988). Therefore, the probability of a separation increases during a first phase of the employment relationship until the unproductive matches are terminated. Thereafter, the separation rate declines. From the employees point of view the separation rate may either increase as the uncertainty over future wage offers declines, or decrease as the opportunity costs of changing the job increase with age. The human capital theory assumes that the employee accumulates, with increased tenure, firm specific human capital (see Jovanovic, 1979). If the costs for this investment are partly paid by the employee as well as by the firm the separation rate will decline with increased tenure, as the rent of this investment is not paid in the case of a separation. On the other hand, if the phase of investment in firm specific human capital is terminated, then the separation rate may increase. With a new employer the employee may face higher wage increases as he might be able to accumulate firm specific human capital within the new job.

Therefore, neither matching nor human capital theory provides a clear result for the impact of duration dependence (tenure) on the separation rate.[52] For the empirical analysis only transitions between employment and non-employment are regarded. Therefore, the effects of dismissals might dominate the effects of a voluntary resignation by the employee as only a few employees become unemployed to search for another job (see Franz, 2003).

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52 The probability of leaving self-employment is discussed in the context of firm survival. See Chapter 7 and Chapter 8.

6 Determinants and Success of Self-Employment

6.1 The Empirical Model

The empirical model is divided in two different stages of transition (see Figure 4) to address the questions: Who is entering self-employment, how successful is self-employment and can the grant of bridging allowance affect the success of the chosen employment opportunity. In a first stage, unemployment duration is investigated to obtain the determinants of self-employment. As possible exit states from unemployment self-employment, paid-employment and out-of-the-labour-force are regarded. It is also possible that the individual stays unemployed during the whole observation period. In such a case the unemployment spell is right-censored. Therefore, in the first stage of the analysis unemployment and out-of-labour force are different employment states.

Figure 4: Different Stages of the Analysis

In the second stage two measures of success are regarded: First, the stability of self-employment and second the income from self-employment. To measure the success of a chosen occupation and the effects of bridging allowance on employ-

ment stability and earnings the methodology of programme evaluation is used.[53] In terms of bridging allowance, two different control groups can be considered to address two different issues. The first issue to be addressed is whether an unemployed person is generally suited for self-employment or not. Therefore, employment duration of those entering self-employment is compared to employment duration of those entering paid-employment. In a further step the effects of bridging allowance on employment duration have to be estimated. For such an analysis one would like to compare the self-employed out of unemployment obtaining bridging allowance with those without promotion. Unfortunately, the available individual data for Germany do not provide any information whether an individual received bridging allowance or not. Therefore, the effects of bridging allowance on employment duration can only be measured as effects of legal changes in the grant of bridging allowance. Overall, we can distinguish between four major periods of different legal arrangements. Before the year of 1986 no such programme was available. Between 1986 and 1988 the programme was employed liberally followed by a restrictive period until July 1994. Since August 1994 bridging allowance has its most liberal arrangement (see Section 2.3.1).

Fairly the same concept is used regarding income. First, income of those entering self-employment is compared with the income of those becoming employees. Second, the impact of legal changes of the bridging allowance on income is determined.

The aim of this study is to compare self-employment and paid-employment with respect to the risk of becoming non-employed. Hence, the analysis follows the aim of bridging allowance to create a stable employment opportunity for the formerly unemployed, no matter whether this employment opportunity is own account work or paid. E.g. if a period of self-employment helps the formerly unemployed individual to find a stable paid-employment opportunity this would be also classified as a success. Therefore, an employment spell is characterised only by its *initial* state following the period of unemployment (see Figure 4). This initial state either can be self-employment or paid-employment. Furthermore, only transitions from employment into the single state of non-employment, including the states of unemployment and out-of-labour-force, are modelled.[54] Transitions from self-employment to paid-employment and vice versa are ignored, i.e. being combined to the single state of employment. Employment duration is then estimated separately for those initially entering self-employment and for those initially entering paid-employment, respectively.

Again, the analysis of income follows the same concept; i.e. income is estimated separately for individuals being employed, either self or paid, in accordance with their labour market status initially after unemployment, without regarding transitions between the states of self- and paid-employment afterwards.

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[53] For an extensive discussion of evaluation methodologies see Chapter 4.

[54] The inclusion of unemployment and out-of-labour-force into one state does not restrict the analysis as only the overall hazard from employment, i.e. the survival rate, has to be estimated to determine job stability.

6.2 The Discrete Hazard Rate Model with Unobserved Heterogeneity

6.2.1 The Hazard Rate in Discrete Time

For the econometric analysis discrete hazard rate models including unobserved heterogeneity are used to measure the determinants and the stability of self-employment compared to paid-employment.[55] For both stages, reduced forms are estimated. Given the monthly information in the German Socio-Economic Panel on employment status and the associated heavy ties of observations, the use of discrete time models rather than continuous time models seems to be appropriate.

The basic concept of discrete hazard rate models is to divide the variable of interest, namely duration of a specific process, into t discrete time intervals.[56] Now assume T as a non-negative random variable, taking integer values only, which denotes the amount of time spent in a certain state before transition or censoring occurs. Then $T = t$ if transition occurs in the interval $[I_{t-1}, I_t)$ and $T > t$ if the spell is censored. The framework of discrete hazard rate models proceeds by defining the hazard rate λ_{ij}^k as the probability for the i-th individual in spell k to leave into state j during the time interval t conditional on occupying this state until t, i.e.

$$\lambda_{ij}^k(t \mid x_{ij}(t), \varepsilon_i) = \Pr[T_i^k = t, \Omega = j \mid T_i^k \geq t, x_{ij}(t), \varepsilon_i] \qquad (6.1)$$

$$i = 1 \ldots N\ ;\ k = 1 \ldots K_i;\ j = 1 \ldots J.$$

$x_{ij}(t)$ is a state specific vector of (time-varying) covariates (see Section 6.4) for individual i in interval t, and ε_i is an individual and time-invariant effect, which accounts for unobserved population heterogeneity and is assumed to be uncorrelated with the observable individual characteristics $x_{ij}(t)$. In the stage of the unemployment duration analysis $\Omega = 1$ if transition is into self-employment, $\Omega = 2$ if transition is into paid-employment and $\Omega = 3$ if transition is into out-of-labour-force. In the second stage, only one state, namely non-employment, is considered.

The overall hazard rate is given as the sum of the state specific rates. This is

$$\lambda_i^k(t \mid x_i(t), \varepsilon_i) = \sum_{j=1}^{J} \lambda_{ij}^k(t \mid x_{ij}(t), \varepsilon_i) \cdot \qquad (6.2)$$

The probability of surviving a specific interval t, i.e. staying unemployed in the first stage or staying employed in the second stage, conditional on having been in this state until $t-1$ is given by

$$1 - \lambda_i^k(t \mid x_i(t), \varepsilon_i) = \Pr[T_i^k > t \mid T_i^k \geq t, x_i(t), \varepsilon_i] \cdot \qquad (6.3)$$

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55 For a survey on duration models see e.g. Petersen (1995).

56 The derivation of the discrete hazard rate model follows Steiner (1997). He applies a similar model on unemployment duration. For the application of this model see also Steiner (2001).

This leads to the unconditional probability of remaining in the original state, the so-called survivor function, which is defined as

$$S_i^k(t \mid x_i(t), \varepsilon_i) \equiv \Pr[T_i^k > t \mid x_i(t), \varepsilon_i] = \prod_{s=1}^{t-1} (1 - \lambda_i^k(s \mid x_i(s), \varepsilon_i)) \cdot \tag{6.4}$$

Thus, the unconditioned probability of leaving the original state into state j in interval t can be expressed in terms of the respective hazard rates as

$$\Pr[T_i^k = t \mid x_i(t), \varepsilon_i] = \lambda_i^k(t \mid x_i(t), \varepsilon_i) \prod_{s=1}^{t-1} (1 - \lambda_i^k(s \mid x_i(s), \varepsilon_i)) \cdot \tag{6.5}$$

The next step is to specify a functional form for the hazard rate. For this analysis, the logistic function is used as a non-proportional hazard specification.[57] Therefore, the hazard rate is given as

$$\lambda_{ij}^k(t \mid x_{ij}(t), \varepsilon_i) = \frac{\exp(\alpha_j(t) + \beta_j' x_{ij}(t) + \varepsilon_i)}{1 + \sum_{l=1}^{L} \exp(\alpha_l(t) + \beta_l' x_{ij}(t) + \varepsilon_i)}, \tag{6.6}$$

and the survivor function as

$$S_i^k(t \mid x_{ij}(t), \varepsilon_i) = \prod_{s=1}^{t-1} \frac{1}{1 + \sum_{l=1}^{L} \exp(\alpha_l(s) + \beta_l' x_{il}(s) + \varepsilon_i)}. \tag{6.7}$$

$\alpha_j(t)$ is the so-called baseline hazard rate, which describes the dependence of the hazard rate on process time (duration dependence). The baseline hazard rate is modelled as piece-wise constant hazard rate by using dummy variables for different categories of process time. Such a flexible (non-parametric) modelling seems to be important to avoid serious misspecifications. Narendranathan and Stewart (1993) claim the importance of modelling the baseline hazard rate non-parametrically to avoid biased estimates due to parametric misspecifications, compared to model the unobserved heterogeneity non-parametrically as suggested by Heckman and Singer (1984b).

The competing risks of leaving unemployment are jointly estimated using a random-effects multinomial model, with four distinct choices in the first stage, namely unemployment, self-employment, paid-employment and out-of-labour-force, the first one being the base category. Compared to a separated estimation of competing risks, the joint estimation accounts for possible effects of the unobserved characteristics on the overall hazard rate from unemployment. If these effects were common to or correlated across the states a separate estimation would lead to biased estimates (see Petersen, 1995). In the second stage a binary random-effects-logit-model is estimated with the choices employment, which is the base category, and non-employment.

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57 The non-proportional specification has less restrictive assumptions than proportional hazard rate models, which assume that effects of the covariates on the hazard rate are independent of duration. See e.g. Kalbfleisch and Prentice (1980) or Lancaster (1990) for more details.

Finally, to derive the likelihood function we can define two indicator variables for the unemployment duration model, which are

$$\delta_{ij}^k = \begin{cases} 1 & \text{if the k-th unemployment spell of individual i ends in state j} \\ 0 & \text{otherwise} \end{cases}$$

$$c_i^k = \begin{cases} 1 & \text{if the k-th unemployment spell of individual i is right-censored} \\ 0 & \text{otherwise} \end{cases}$$

For the employment duration models, the same indicator variables can be defined as

$$\delta_{ij}^k = \begin{cases} 1 & \text{if the k-th employment spell of individual i ends in non-employment} \\ 0 & \text{otherwise} \end{cases}$$

$$c_{ij}^k = \begin{cases} 1 & \text{if the k-th employment spell of individual i is right-censored} \\ 0 & \text{otherwise} \end{cases}.$$

It should be well noted that the index j still refers to the state of exit from unemployment. Therefore, $j = 1$ if the initial state after unemployment is self-employment and $j = 2$ if the initial state is paid-employment.

Consequently the resulting likelihood function for the unemployment model of the first stage will be

$$L = \int_{-\infty}^{\infty} [\phi(\varepsilon_i) \prod_{i=1}^{N} \prod_{k=1}^{K_i} \prod_{j=1}^{J} \lambda_{ij}^k (t_i \mid x_{ij}(t_i), \varepsilon_i)^{\delta_{ij}^k} \prod_{s=1}^{t_i - 1} (1 - \lambda_i^k (s \mid x_i(s), \varepsilon_i))^{c_i^k}] d\varepsilon_i , \qquad (6.8)$$

with ϕ denoting the density of some parametrical distribution. From (6.8) it can be seen that the contribution to the likelihood function of a completed unemployment spell is equal to the state specific hazard rate. For a censored spell the contribution is given by the overall hazard rate, i.e. the survivor function.

The analogy of (6.8) to the multinomial random-effects-logit-model can easily be seen.[58] Rearrange the data in a way that you have K times t observations for each individual. For all t of spell k_i where the individual stays unemployed $c_i^k = 1$, which is identical to $\delta_{ij}^k = 0$ for all j. If the spell is not right-censored, then transition to state j occurs in $t = T_i^k$, i.e. during the last period of k_i, and thus defining $\delta_{ij}^k = 1$.[59] This results in a model of multinomial discrete choice of δ_{ij}^h with $h = Kt$, for each observation within an individual. Therefore, for each period t within each

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58 For an application see Jenkins (1995).

59 It should be well noted that transition only occurs during $t = T_i^k$ and that for right-censored spells $\delta_{ij} = 0$ for $t = T_i^k$.

spell k_i the individual has the choice between the states of unemployment, self-employment, paid-employment and out-of-labour force.

For the employment model of the second stage the resulting likelihood function is given by

$$L_j = \int_{-\infty}^{\infty} [\phi(\varepsilon_{ij}) \prod_{i=1}^{N} \prod_{k=1}^{K_i} \lambda_{ij}^k (t_i \mid x_{ij}(t_i), \varepsilon_{ij})^{\delta_{ij}^k} \prod_{s=1}^{t_i - 1} (1 - \lambda_{ij}^k (s \mid x_{ij}(s), \varepsilon_{ij}))^{c_{ij}^k}] d\varepsilon_{ij} \cdot \tag{6.9}$$

Again, it should be well noted that j refers to the exit states from unemployment. Hence, in the second stage two separately estimated models of binary choice are used: One for those initially entering self-employment and one for those initially entering paid-employment.

6.2.2 Specifying Unobserved Heterogeneity

The final step towards the definition of the likelihood function is specifying the unobserved individual heterogeneity component ε_i. Neglecting unobserved heterogeneity may result in biased estimates of the coefficients. A common solution to this problem is the implementation of a parametrical, e.g. the normal distribution, for ε_i. In this case in equations (6.8) and (6.9) ϕ denotes the density of the standard normal distribution.

However the shortcoming of this specification is threefold. First, integrating out ε_i goes along with heavy computational burdens. The typically used procedure is the Gauss-Hermite-Quadrature method. However, the Gauss-Hermite-Quadrature yields bad results for large T, i.e. $T > 50$[60]. As this study uses monthly spell data of sixteen waves, the panel size is quite large with T up to 192. Second, the assumption of a specific parametric distribution is hardly testable and third, Heckman and Singer (1984b) showed that the choice of the parametrical distribution for the unobserved heterogeneity may seriously influence the parameter estimates. Even if, as Narendranathan and Stewart (1993) claimed, the bias in the Heckman and Singer paper mainly resulted from the parametrical modelling of the baseline hazard rate than from the parametrical distribution of the unobserved heterogeneity, the first shortcoming is still present. Therefore, I employ a non-parametrical distribution of ε_i using discrete mass points. In particular, the time-invariant individual effect ε_i is assumed to have a discrete probability distribution with a specific number of mass points M, i.e. ε_i^m with $m = 1, 2, \dots M$. The expectation of ε_i is assumed to be zero, which yields

$$E[\varepsilon_i] = \sum_{m=1}^{M} \Pr[\varepsilon_i^m] \varepsilon_i^m = 0 \, , \tag{6.10}$$

where $\Pr[\varepsilon_i^m]$ denotes the probability of ε_i^m. The probabilities $\Pr[\varepsilon_i^m]$ are assumed to sum up to one, i.e.

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[60] See e.g. Stata (2000), Handbook Release 6.0, commands "xtlogit" or "quadchk" for a discussion on the reliability of the Gauss-Hermite-Quadrature method.

$$\sum_{m=1}^{M} \Pr[\varepsilon_i^m] = 1 \cdot \tag{6.11}$$

Finally, ε_i^m is assumed to be orthogonal to the covariates x_{ij}. Hence, the resulting likelihood function for the unemployment model looks like

$$L = \sum_{m=1}^{M} [\Pr[\varepsilon_i^m] \prod_{i=1}^{N} \prod_{k=1}^{K_i} \prod_{j=1}^{J} \lambda_{ij}^k (t_i \mid x_{ij}(t_i), \varepsilon_i^m)^{\delta_{ij}^k} \prod_{s=1}^{t_i - 1} (1 - \lambda_i^k (s \mid x_i(s), \varepsilon_i^m))^{c_i^k}] \tag{6.12}$$

and for the employment models like

$$L_j = \sum_{m=1}^{M} [\Pr[\varepsilon_{ij}^m] \prod_{i=1}^{N} \prod_{k=1}^{K_i} \lambda_{ij}^k (t_i \mid x_{ij}(t_i), \varepsilon_{ij}^m)^{\delta_{ij}^k} \prod_{s=1}^{t_i - 1} (1 - \lambda_{ij}^k (s \mid x_{ij}(s), \varepsilon_{ij}^m))^{c_{ij}^k}] \cdot \tag{6.13}$$

Let us define q^m as the estimated parameter for $\Pr[\varepsilon_i^m]$ and μ^m as the estimated parameter of ε_i^m.[61] In the case of $M = 2$ the state specific contribution of the non-censored *k-th* spell of individual *i* to the likelihood function would be

$$\begin{aligned} L_{ij}^k = {} & q^1 \left(\frac{\exp(\alpha_j(t_i) + \beta_j' x_{ij}(t_i) + \mu^1)}{1 + \sum_{l=1}^{L} \exp(\alpha_l(t_i) + \beta_l' x_{ij}(t_i) + \mu^1)} \right) . \\ & + (1 - q^1) \left(\frac{\exp(\alpha_j(t_i) + \beta_j' x_{ij}(t_i))}{1 + \sum_{l=1}^{L} \exp(\alpha_l(t_i) + \beta_l' x_{ij}(t_i))} \right) \end{aligned} \tag{6.14}$$

With q^1 denoting the probability of the first mass point and μ^1 representing a constant, which is included in the first population heterogeneity regime. For identification purpose the constant in the second regime is set to zero. Thus, the estimated parameters comprise α_j, β_j, q^1 and μ^1.

Hence, using the assumptions (6.10) and (6.11) the probability of the second mass point q^2 is defined as $1 - q^1$ and the constant for the second heterogeneity regime is defined as $\mu^2 = -q^1\mu^1/(1-q^1)$.

The advantages of specifications (6.12) and (6.13) over (6.8) and (6.9) are obvious. First, expecting out the individual heterogeneity component, can be done within the standard maximum likelihood framework, employing e.g. the Newton-Raphson maximisation algorithm. Second, and fairly more important than the technical advantage, there is no possibility of a misspecification of the distribution of the individual heterogeneity. The most crucial task, which has to be addressed, is the determination of the number of mass points *M*. In general, neither theory nor data give much guidance when choosing the number of mass points. In recent years there have been some approaches to determine *M* (see Heckman and Singer, 1984a, Chamberlain, 1985 or Baker and Melino, 2000), but only a few studies employed these estimators (e.g. Puhani, 1999, Lalive et al. 2000 or Steiner, 2001).

[61] To facilitate writing the following refers to the unemployment model. Hence index *j* is suppressed for the unobserved heterogeneity.

The difficulty of finding the appropriate number of mass points arises from the fact that a standard likelihood ratio test for the null hypotheses of no unobserved heterogeneity, i.e. the number of mass points is zero, violates standard regularity conditions (see Gritz, 1993). Therefore I follow the strategy of Baker and Melino (2000), who choose among the different models using several information criteria (IC). They start in estimating a model without any mass points, i.e. without unobserved heterogeneity, than adding two mass points, three mass points, etc. until the IC is not improved by adding an additional mass point. Baker and Melino showed the importance of using an IC instead of comparing the values of the likelihood functions. In general, this comparison would lead to an overestimation of the number of mass points. In this study I employ three IC, namely the Akaike IC (AIC), the Hannan-Quinn IC (HQIC) and the Bayesian IC (BIC). The choice of M is based on the model which is preferred according to at least two criteria.

An IC is typically defined as

$$IC = \ln L - gp, \tag{6.15}$$

where p is the number of parameters estimated and g is a penalty function. The AIC sets $g = 1$, the HQIC sets $g = ln(ln(N))$ and BIC sets $g = ln(N)/2$. Whereas the AIC is the basis for the likelihood ratio test, the HQIC was proposed to determine the order of an autoregressive process and the BIC to choose the covariates in a regression setting.[62] The three IC not always lead to the same conclusion on the number of mass points to choose. The AIC penalises the addition of further parameters least and the BIC most.

Estimation of (6.12) and (6.13) is carried out using Stata's ML method (see Stata, 2000).[63]

6.2.3 Testing the Independence of Irrelevant Alternatives (IIA) Assumption

A well known critical assumption of the multinomial logit model is the independence of the irrelevant alternative (IIA). McFadden (1973) has shown for the multinomial logit model that if the J disturbances ε_{ij} are independent and identically distributed with extreme value distribution, i.e.

$$F(\varepsilon_{ij}) = \exp(-e^{-\varepsilon_{ij}}) \tag{6.16}$$

then the state specific hazard rate λ_{ij} is defined as

62 See Sin and White (1996) for a survey on various IC.

63 The estimator "mlogXmX" is programmed using Stata's (Version 6.0) d2-method. Computation time on a Athlon 1.3 GHz is about 5 days for the unemployment model with four mass points for the Sample-All. The programme code together with a helpfile is available by the author upon request.

$$\lambda_{ij}(t \mid x_{ij}(t), \varepsilon_{ij}) = \frac{\exp(\beta_j' x_{ij}(t) + \varepsilon_{ij})}{1 + \sum_{l=1}^{L} \exp(\beta_l' x_{il}(t) + \varepsilon_{il})} . \quad (6.17)$$

From equations (6.17) and (6.7) it can be seen that the ratio of the state specific hazard rate λ_{ij} and the survival rate S_i is independent from the other states l. Admittedly, the IIA assumption only has to be tested in the absence of unobserved heterogeneity, i.e. the model without any mass points, as by the inclusion of individual heterogeneity the correlation between the alternatives is explicitly modelled.

The IIA is tested using two different procedures: The basic Hausman test (Hausman and McFadden, 1984) and the Small-Hsiao test. The Hausman test is based on the idea that the absence of the irrelevant alternatives does not change the parameter estimates systematically, but would improve the efficiency of the estimation. In contrast, if the IIA assumption is not met, the parameter estimates would be biased. Hence, the test statistic is given by

$$HM = (\hat{\beta}_r - \hat{\beta}_f)'[\hat{V}_r - \hat{V}_f]^{-1}(\hat{\beta}_r - \hat{\beta}_f), \quad (6.18)$$

where $\hat{\beta}_r$ is the efficient but maybe biased vector of parameter estimates of the restricted choice set and $\hat{\beta}_f$ is the maybe inefficient but consistent vector of estimates of the full choice set. $\hat{V}_r$ and $\hat{V}_f$ are the variance-covariance matrices of the restricted and full choice sets, respectively. *HM* is asymptotically distributed as chi-squared with the number of parameters equal to the degrees of freedom. Furthermore, the test is on the null hypothesis of the presence of the IIA.

A shortcoming of the Hausman test is the fact that the number of observations for the restricted and the full choice set, respectively, are different. As a consequence, it might be possible that the difference of $\hat{V}_r$ and $\hat{V}_f$ is not positive definite and therefore the test statistic might be negative. In such a case the Hausman test is not valid for testing the IIA assumption. However, Small and Hsiao (1985) propose an alternative test, which does not have these inferential shortcomings.[64] First, they define

$$\hat{\theta}_f = (\frac{\sqrt{2}}{2}\hat{\beta}_f^A + (1 - \frac{\sqrt{2}}{2})\hat{\beta}_f^B \quad (6.19)$$

and

$$\hat{\theta}_r = \hat{\beta}_r^B, \quad (6.20)$$

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[64] Lee (1996) suggests a correction for the computation of the difference of the variance-covariance matrices which always yields a positive test statistic. However, Lee's procedure is much more complex than the procedure proposed by Small and Hsiao (1985).

where $\hat{\beta}_f^A$ and $\hat{\beta}_f^B$ are the parameter estimates of the full choice set on two distinct, randomly drawn sub-samples of the whole sample of observation. Sample A and Sample B sum up to the whole sample and should be approximately of equal size. Therefore, $\hat{\theta}_f$ is a weighted coefficient vector of these two sub-samples, whereas $\hat{\theta}_r$ is the vector of parameter estimates of the restricted choice set for the second sub-sample B. Small and Hsiao showed that

$$SH = -2[L(\hat{\theta}_f) - L(\hat{\theta}_r)] \tag{6.21}$$

is asymptotically chi-square distributed, where $L(\hat{\theta}_f)$ is the value of the likelihood function for the weighted parameter vector for the full choice set and $L(\hat{\theta}_r)$ is the value of the likelihood function for the restricted set. Again, the null hypothesis of the presence of IIA is tested. A minor disadvantage of the Small-Hsiao test is that the test statistics can not be repeated as the sub-samples A and B are drawn randomly.

For this reason in the present study the Hausman test is employed in general and only in the case of a negative test statistic the Small-Hsiao test is carried out.

6.3 Measuring the Success of Self-Employment

6.3.1 The Stability of Self-Employment

To assess the stability of self-employment compared to paid-employment the "potential-outcome-approach to causality" is used (see Rubin, 1974 and Chapter 4), i.e., the survival rates in self-employment are compared to the potential survival rates in paid-employment in the sample of the self-employed.[65] Hence, the difference Δ_{SE}[66] in the survival rates among those entering self-employment is given as the difference of the expected observable survival rate in self-employment and the expected potential survival rate in paid-employment, which is

[65] In the following the terms self-employment and paid-employment always refer to the initial state after unemployment. The wording may be imprecise as e.g. a self-employment spell can include times of paid-employment, but to differentiate between self-employment out of unemployment and paid-employment out of unemployment this facilitates things a lot.

[66] To facilitate reading the index j is in the following defined as $j = 1 = SE$ and $j = 2 = PE$.

$$\begin{aligned}\Delta_{SEi} &= E[S^k_{SEi} \mid x_{SEi}, \delta^k_{iSE} = 1] - E[S^k_{PEi} \mid x_{SEi}, \delta^k_{iSE} = 1] \\ &= \sum_{m=1}^{M_{SE}} q^m_{SE} \prod_{s=1}^{t_i - 1} \left(\frac{1}{1 + \exp(\alpha_{SE}(s) + \beta'_{SE} x_{SEi}(s) + \mu^m_{SE})}\right), \\ &- \sum_{m=1}^{M_{PE}} q^m_{PE} \prod_{s=1}^{t_i - 1} \left(\frac{1}{1 + \exp(\alpha_{PE}(s) + \beta'_{PE} x_{SEi}(s) + \mu^m_{PE})}\right)\end{aligned} \tag{6.22}$$

where S_{SE} and S_{PE} are the unconditioned (observable) survival rates in self-employment and paid-employment, respectively, $x_{SE}(t)$ is the vector of the characteristics of the initially self-employed, α_{SE} and β_{SE} are the estimated coefficients of the probability of leaving self-employment and α_{PE} and β_{PE} are the estimated coefficients of the probability of leaving paid-employment.[67] The second expectation of the difference is of course never observed in reality, but can be simply estimated by plugging the coefficients of the paid-employment model on the characteristics $x_{SE}(t)$ of the self-employment model. The naive comparison of the observable survival rates in employment among the self-employed and the observable survival rates in employment among the paid-employed can seriously bias the effects, because of self-selection processes in either state. Thus, it is very likely that the individual characteristics of the self-employed differ from the characteristics of the paid-employed, i.e. the naive control group of the paid-employed is not an adequate control group for the sample of the self-employed (see Section 6.5.2). To control for the selectivity, all characteristics explaining the transition from unemployment to self-employment are included in the survival equation. Thus, a reduced form control function estimator is used (see Barnow et al., 1980 and Section 4.2.1).

Whereas Δ_{SE} refers to what is known as treatment-on-the-treated, a corresponding effect for the sample of the initially paid-employed could be derived as

$$\begin{aligned}\Delta_{PEi} &= E[S^k_{PEi} \mid x_{PEi}, \delta^k_{iPE} = 1] - E[S^k_{SEi} \mid x_{PEi}, \delta^k_{iPE} = 1] \\ &= \sum_{m=1}^{M_{PE}} q^m_{PE} \prod_{s=1}^{t_i - 1} \left(\frac{1}{1 + \exp(\alpha_{PE}(s) + \beta'_{PE} x_{PEi}(s) + \mu^m_{PE})}\right) \\ &- \sum_{m=1}^{M_{SE}} q^m_{SE} \prod_{s=1}^{t_i - 1} \left(\frac{1}{1 + \exp(\alpha_{SE}(s) + \beta'_{SE} x_{PEi}(s) + \mu^m_{SE})}\right).\end{aligned} \tag{6.23}$$

Then, Δ_{PE} refers to treatment-on-the-non-treated.

6.3.2 Income Effects of Self-Employment

To determine the differential between income from self-employment and paid-employment the same "potential-outcome-approach to causality" is used. In contrast to the analysis of employment stability the income analysis is based on stan-

[67] It should be well noted that the employment duration model facilitates to a binomial logit model as only one state of exit is modelled.

dard fixed effects estimation.[68] Hence, for those initially entering self-employment as well as for those initially entering paid-employment, monthly gross income is estimated separately on the basis of a fixed-effects estimation of the linear regression model. The log of the monthly gross income is given as

$$\ln y_{ihj} = \gamma'_j z_{ihj} + \varepsilon_{ij} + u_{ihj} \,. \tag{6.24}$$

z_{ihj} is a vector of time-varying covariates, γ_j is the corresponding coefficient vector, ε_{ij} a time-invariant unobserved individual effect and u_{ihj} is an independent, identical distributed (iid) disturbance with mean zero and variance $\sigma_{uj}^{\;2}$. Moreover, u_{ihj} is assumed to be uncorrelated with z_{ihj}. Finally, $j = 1$ if the transition from unemployment is into self-employment and $j = 2$ if the transition is into paid-employment. A common procedure to eliminate the unobserved heterogeneity ε_{ij} is to subtract the average of (6.24) from (6.24). Under the assumption that $\sum_{i=1}^{N_j} \varepsilon_{ij} = 0$ this subtraction yields

$$\ln y_{ihj} - \ln \bar{y}_{ij} = \gamma'_j (z_{ihj} - \bar{z}_{ij}) + u_{ihj} - \bar{u}_{ij} \,. \tag{6.25}$$

Ordinary least squares estimation of (6.25) produces consistent estimates of γ_j.

To obtain estimates of the hypothetical income from paid-employment for the self-employed and vice versa, it can be seen from equation (6.24) that an estimate of the hypothetical fixed effect is necessary, too. Consequently, the time-invariant variables, which did not enter the fixed effects estimation, are regressed on the predicted value of the fixed effect $\hat{\varepsilon}_{ij}$, which is obtained by the ordinary least squares estimation of (6.25), i.e.

$$\hat{\varepsilon}_{ij} = \omega'_j z_{ij} + v_{ij} \,. \tag{6.26}$$

Ordinary least squares estimation of (6.26) yields consistent estimates for the coefficient vector ω_j of the time-invariant covariates z_{ij}. v_{ij} is assumed to be iid with mean zero and variance $\sigma_{vj}^{\;2}$.

Following the previous section the income effect is separately calculated for the sample of the initially self-employed (treatment-on-the-treated) and for the sample of the initially paid-employed (treatment-on-the-non-treated). Analogous to the computation of employment stability, the hypothetical income either from self- or from paid-employment is obtained by plugging the covariates of the respective sample on the coefficient vector obtained for the other sample. Furthermore, as the log of income is estimated, the income variable has to be transformed in amounts of DM. Hence, the half mean square error has to be added to the estimated log income (including the estimated fixed effect) to obtain monthly income in DM. Therefore, the treatment-on-the-treated effect for income is given by

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68 For the derivation of the fixed-effects estimator see e.g. Greene (1997). According to the Hausman test the fixed-effects estimator is preferred over the random effects estimator for this analysis.

$$\begin{aligned}\Delta y_{SEi} &= E[y_{SEi} \mid \delta^k_{iSE} = 1] - E[y_{PEi} \mid \delta^k_{iSE} = 1] \\ &= \exp(\gamma'_{SE} z_{SEih} + \omega'_{SE} z_{SEi} + \frac{1}{2}\sigma_{uSE}) \\ &\quad - \exp(\gamma'_{PE} z_{SEih} + \omega'_{PE} z_{SEi} + \frac{1}{2}\sigma_{uPE})\end{aligned}, \qquad (6.27)$$

and the treatment-on-the-non-treated effect by

$$\begin{aligned}\Delta y_{PEi} &= E[y_{PEi} \mid \delta^k_{iPE} = 1] - E[y_{SEi} \mid \delta^k_{iPE} = 1] \\ &= (\gamma'_{PE} z_{PEih} + \omega'_{PE} z_{PEi} + \frac{1}{2}\sigma_{uPE}) \\ &\quad - (\gamma'_{SE} z_{PEih} + \omega'_{SE} z_{PEi} + \frac{1}{2}\sigma_{uSE})\end{aligned}. \qquad (6.28)$$

6.4 Data, Sample and Variables

6.4.1 The German Socio-Economic Panel

The econometric analysis is based on the first 16 waves of the German Socio-Economic Panel (GSOEP) covering the years from 1984 to 1999.[69] Data of the GSOEP is collected yearly starting with 5,921 households. Every person living in these households and aged 16 years and older is interviewed. The first wave included 12,245 persons. The data of these persons was followed up every consecutive year. The number of people was increased due to the splitting of established households and due to children exceeding 16 years of age. As a consequence of the German reunification in 1990, the GSOEP was extended to the new federal states adding 4,453 people. A second extension of the GSOEP took place between 1994 and 1995. Approximately 1,000 immigrants, not living in Germany in 1984 or before, entered the GSOEP. Finally, in 1998 the so-called "Refreshment" Sample was added to the GSOEP, including 1,932 persons. These new entrants overcompensated panel attrition, so that the panel included almost 14,107 individuals in 1999. However, the sample starting in 1984 has shrunk to about 8,000 individuals.

The GSOEP provides yearly information on various individual and household characteristics, such as labour market status, income, education, social background. Besides, the GSOEP contains retrospective information on monthly labour market status and income of the year prior to the interview, the so-called employment and income calendars. This monthly information provides an ideal database to analyse transitions between different labour market states. There are eleven different states reported in the employment calendar.

For the econometric analysis four different states of employment are considered: *self-employment, paid-employment, unemployment and out-of-labour-force.* Unfortunately, self-employment is not reported in the employment calendar. De-

[69] For a detailed description of the GSOEP see http://www.diw.de/english/sop/index.html.

spite that, self-employment spells can be generated using the yearly information on job status as well as the beginning date of the job. Additionally, the income calendar, which provides information on self-employment income, was used to check the yearly information.

Paid-employment includes full-time employment, short time working, part-time employment and training at work. Unemployment refers to registered unemployment, following the same definition used by the Federal Employment Services. This definition disposes of the well-known under- or over-reporting bias: People not seeking employment but being registered are called unemployed while the ones seeking employment but not being registered as unemployed are called not unemployed. In the context of this analysis, however, the official definition is well suited because it corresponds to the legal requirements of receiving the subsidy of bridging allowance (see Section 2.3.1). The out-of-labour-force category includes retirement, maternity leave, schooling, military service, house-husband/-wives and other not specified states.

6.4.2 Samples of Analysis

The sample used for the analysis consists of individuals living somewhere in Germany and being registered as unemployed for at least one month in the period between January 1983 and December 1998. These 6,695 individuals are drawn from the so-called "Artkalen" which is a spell data file constructed out of the employment calendar. The "Artkalen" reports every spell on employment status that has been collected for each interviewed individual including the type of the spell, beginning and end of the spell and the censoring status of the spell. For the econometric analysis, left-censored spells are excluded. Left-censoring occurs due to gaps in the employment history or due to spells which begin prior to January 1983. In addition to left-censoring there is the problem of overlapping spells. For the analysis, only non-overlapping spells were constructed according to the priority: self-employment, paid-employment, unemployment and out-of-labour-force. The only exception is the case of an unemployment spell with the same date of beginning as a self (paid-) employment spell. In such a case, an "artificial" unemployment spell of one month is generated instead of overwriting the complete unemployment spell.

A possible exclusion of certain individuals, e.g. persons aged over 58 years, is not done. Many studies dealing with unemployment duration exclude such individuals, because of special early retirement regulations for those groups. Furthermore, specific sectors for which a high rate of temporary layoffs is prevalent are often excluded, too (see e.g. Steiner, 2001). There are several reasons for the inclusion of all unemployed people in our study: First, from empirical studies carried out by the IAB it is known that bridging allowance is demanded by some unemployed people, older than 60 years of age, before entering retirement pension schemes (see Chapter 3). Second, even if a layoff is merely temporary, the unemployed can claim bridging allowance if he or she is unemployed for at least one month (see Section 2.3.1). Third, the focus of the study is on the analysis of the

determinants of self-employment rather than on the determinants of unemployment duration. Fourth, as the number of self-employed people in the GSOEP is rather small, all self-employed people, which may be eligible for the subsidisation with bridging allowance, should enter the analysis.

Furthermore, the analysis is carried out for two different samples. The first sample includes all individuals living in Germany, whereas the second sample is restricted to people residing in the old federal states. Hereafter the first sample is referred to Sample-All and the second to Sample-West.

Of the 6,695 unemployed individuals, for Sample-All, 10,300 unique not-left-censored spells are constructed. 1,511 (14.7%) of those are right-censored, i.e. ending in unemployment, 239 (2.3%) end in self-employment, 6,736 (65.4%) in paid-employment, 1,800 (17.5%) in out-of-labour-force and 14 have an unknown employment status (see Table 4).[70] This sample yields the base of the analysis of the determinants of the individual labour market status if leaving unemployment.

Table 4: Unique Not-Left-Censored Spells and Employment States

	Sample-All		Sample-West	
	First stage	Second stage	First stage	Second stage
All spells	10,300		6,687	
Right-censored	1,511 (14.7%)		998 (14.9%)	
Self-employment	239 (2.3%)	170 (71.1%)	138 (2.1%)	96 (68.1%)
Non-employment		69 (28.9%)		45 (31.9%)
Paid-employment	6,736 (65.4%)	2,689 (39.9%)	4,213 (63.0%)	1,789 (41.4%)
Non-employment		4,047 (60.1%)		2,538 (58.6%)
Out-of-labour force	1,800 (17.5%)		1,325 (19.8%)	
Missing	14		13	

Note: The number of spells in the second stage for the Sample-West is higher than for the first stage. There are 4,327 spells of paid- and 141 spells of self-employment.

The Sample-West consists of 6,687 unique not-left-censored spells, of which 998 (14.9%) are right-censored, 138 (2.1%) end in self-employment, 4,213 (63.0%) in paid-employment and 1,325 (19.8%) in inactivity. For 13 spells the exit status is unknown.

The second stage of the analysis, employment duration, is based either on the unemployment spells ending in *self-employment* or on the spells ending in *paid-employment* (see Figure 4 of Section 6.1). Out of these initial spells I construct an employment spell, which lasts until the person becomes unemployed or drops out of the labour force, no matter if he or she quits self-employment for paid-employment or vice versa. This concept follows the aim of bridging allowance formulated by the Federal Employment Services to get the unemployed back into stable employment, no matter whether this employment is own account work or paid (see Section 2.3.2). This reflects the belief that self-employment is seen as a

[70] The unknown status is due to the construction of self-employment spells. For some spells it was not possible to differentiate between self-employment or paid-employment.

signal of economic activity or motivation by a possible employer. Therefore, the take up of a paid job would be classified as a success of bridging allowance.

Hence, a labour market status is considered to be stable as long as the individual remains employed. Accordingly, there is only a single risk of leaving the status of employment modelled, namely *non-employment*, which includes unemployment and out-of-labour-force. For the Sample-All, 170 (71.1%) spells out of the 239 unemployment spells ending in self-employment are right-censored i.e. end in self-employment or paid-employment. The remaining 69 (28.9%) spells end in non-employment. In the sample of the paid-employed, only 2,689 (39.9%) of the 6,736 spells are right-censored and 4,047 (60.1%) end in non-employment (see Table 4). Thus, the shares between censored and non-censored spells is nearly reversed for the two samples.

As the Sample-West is a sub-sample of the Sample-All in each stage of the analysis the number of spells in the employment duration models can be higher than indicated by the unemployment duration model. Such a difference in the number of spells occurs if the region of residence for an employment spell in the second stage of the analysis switches from the new to the old federal states. Suppose, for example an unemployment spell in the first stage of the analysis, which is located in the new federal states during the whole period of observation, which is synonymous with an employment spell in the second stage of the analysis starting in the new federal states. If the region of residence of this spell switches to the old states during employment duration, this spell will belong to the Sample-West in the second stage but not in the first stage.[71] Therefore we find 4,327 employment spells starting in paid-employment in the Sample-West. 1,789 (41.4%) of these spells are right-censored and 2,538 (58.6%) end in non-employment. In the sample of the self-employed there are 141 spells of which 96 (68.1%) are right- and 45 (31.9%) are non-censored.

6.4.3 Variables, Definitions and Descriptives

The factors which determine the transition from unemployment to other labour market states are mainly derived from the theoretical models described in Chapter 5. Furthermore, variables controlling for process and calendar time effects are included. Table 5 provides the definitions of these variables, whereas Table 6 reports some descriptive information.[72] Process time, the so-called baseline hazard rate, is modelled non-parametrically by using 10 different categories. To control seasonal effects for each quarter of entrance into labour market state and each quarter of actual process time, a dummy variable is constructed. Calendar time is included using four dummy variables, which also characterise four different peri-

[71] Hence, it should be well noted that the region of residence of an individual is constructed as time-varying variable (see below).

[72] As the results for the Sample-West are similar to those for the Sample-All the discussion is concentrated on the Sample-All. Descriptive statistics for the Sample-West can be found in the Appendix in Table 41 and Table 42.

ods of legal regulations of bridging allowance. During the first period from January 1983 to December 1985, no bridging allowance was available. The second period from January 1986 to July 1988 is characterised by a liberal employment of bridging allowance, whereas during the period from August 1988 to July 1994 the legal regulations and their implementations were more or less restrictive. During the period following August 1994, bridging allowance has been employed most liberally.

In accordance with search theory (see Chapter 5), I include the income replacement ratio (IRR) to model unemployment compensation. The IRR is calculated as the ratio of actual unemployment benefits and expected earnings (see Steiner, 1997) instead of earnings in the previous job. Expected earnings are gross earnings estimates from reduced form earnings functions, calculated separately for the paid-employed and the self-employed.[73] Thus there are three different IRRs: One for those spells ending in paid-employment, one for those ending in self-employment and a weighted IRR, if the spell is right-censored. The weight is obtained from the sample probability of being self-employed and paid-employed, respectively.[74] For transitions into out-of-labour-force unemployment benefits are included instead of the IRR.

A central variable for the explanation of transitions to self-employment, which is provided by the theory of utility maximisation, is represented by the ratio of expected self- and paid-employment income (SPIR) (see Chapter 5). The SPIR is obtained from the same earnings equations as the IRR. The sign of the estimated coefficient is expected to be positive in the self-employment equation and negative in the paid-employment equation, respectively. The SPIR does not enter the out-of-labour-force equation.

Furthermore, variables explaining the endowment with human capital are included: Namely, the individual age as a proxy of labour market experience and the degree of occupational qualification. In addition, financial endowment is regarded due to home-ownership and capital income. The employment history is addressed by the age at the first job and the job position. To control for the socio-economic background several variables are used, such as gender, foreigner, disabled, marital status, children, labour market participation as well as income of the partner,

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[73] Earnings of the paid-employed were estimated using 16 cross-sections obtaining 16 different parameter vectors. Due to a smaller sample size, self-employment earnings were estimated on a pooled sample using GEE methods (see Liang and Zeger, 1986). These estimates were obtained using a reduced form instead of a structural selection model to control for labour market participation. A possible heteroscedasticity problem may arise from the fact that SPIR and IRR, respectively, are estimated variables. Therefore, the standard errors for these variables may be inconsistent in the duration analysis. To address this problem bootstrapped standard errors could be used in principle. However, bootstrapping is not applicable to this analysis as computation of the multinomial logit model with random effects takes between one and five days per model. See Appendix A.1 for the calculation of the SPIR and IRR.

[74] I.e. unemployment-benefits/[Probability(being self-employed)*expected-self-employment-income + Probability(being paid-employed)*expected-employment-income)].

household-income and the employment status of the father, when the individual was aged fifteen. Moreover, gender is interacted with marital status, children and occupational qualification in order to capture differences in labour market behaviour between males and females.

Table 5: Definition of the Analysed Variables

Variables	Definitions
Employment Status	In the first stage of the analysis 4 states of employment: unemployed, self-employed, paid-employed and out-of-labour-force. In the second stage 2 states of employment: employed, non-employed.
	Covariates for both stages of analysis
Process time	10 categories for the first stage of analysis: 1 month (reference category; 2 months; 3 months; 4 months; 5 months; 6 months; 7 to 9 months; 10 to 12 months; 13 to 18 months; 19 months and more. 11 categories for the second stage of the analysis 1 to 3 months (reference category); 4 to 6 months; 7 to 9 months; 10 to 12 months; 13 to 18 months; 19 to 24 months; 25 to 30 months; 31 to 36 months; 37 to 48 months; 49 to 60 months; 61 months and more
Calendar period	4 categories: prior to 1986 (reference category); between January 1986 and July 1988; between August 1988 and July 1994; after July 1994
Calendar quarter	4 categories: first quarter (reference category); second quarter; third quarter; fourth quarter
Quarter of entry in employment status	4 categories: first quarter (reference category); second quarter; third quarter; fourth quarter
Age	8 categories: under 25; from 25 to under 30; from 30 to under 35; from 35 to under 40 (reference category); from 40 to under 45; from 45 to under 50; from 50 to under 55; 55 and older.
Occupational degree	6 categories: no occupational degree; apprenticeship; technical college; master craftsman; higher technical college; university
Nationality	1: foreigner; 0: German
Disability	1: disabled; 0: not disabled
Gender	1: female; 0: male
Marital status	3 categories: married (reference category); single; not married
Children	1: children under age of 16 living in the household; 0: otherwise
Employment status of spouse	5 categories: no spouse (reference category); spouse full-time employed; spouse part-time employed; spouse unemployed; spouse out-of-labour-force
Income of spouse	Monthly gross income of spouse in 1,000 DM in prices of 1991
Household income	Monthly gross household income in 1,000 DM in prices of 1991
Capital income	Monthly gross income from capital in 1,000 DM in prices of 1991
Housing ownership	1: housing ownership; 0: no housing ownership
SPIR	Ratio of expected monthly gross self-paid-employment income in prices of 1991; for calculation see Appendix A.1
IRR	Ratio of monthly unemployment benefits and monthly gross expected income in prices of 1991; for calculation see Appendix A.1
Unemployment benefits	Monthly unemployment benefits in prices of 1991

Employment status of father	3 categories: not-self-employed (reference category), self-employed, employment status is missing
Employment status at first job	4 categories: white-collar (reference category), blue-collar, self-employed, employment status is missing
GSOEP sample	3 categories: GSOEP Sample A and E (reference category) including Germans and no main foreigner groups; GSOEP Sample B and D including main foreigner groups of Turks, Greeks, Yugoslavians, Spanish, Italians and Immigrants; GSOEP Sample C including German residents of the former GDR
Region	5 categories: northern federal states including Schleswig-Holstein, Hamburg, Niedersachsen and Bremen; North-Rhine Westphalia (reference category); middle-western German federal states including Hesse; Rhineland-Palatinate and Saarland; southern federal states including Baden-Württemberg and Bavaria; north-eastern federal states including Mecklenburg-Vorpommern, Brandenburg, Berlin and Saxony-Anhalt; south-eastern federal states including Thuringia and Saxony
Community size	4 categories: less than 20,000 citizens (reference category); 20,000 up to under 100,000 citizens; 100,000 up to under 500,000 citizens; 500,000 and more citizens
Unemployment to vacancy (UV) ratio	Monthly ratio of the number of unemployed people and the inflow of vacancies in the federal state of residence
GDP growth rate	Yearly growth rate of the GDP in the federal state of residence in %.
Interest rate	From January 1983 to October 1996 average monthly interest rate in % for credits up to 1 million DM and from November 1996 to December 1998 average monthly interest rate in % for credits up to 200,000 DM
Worries about the personal economic situation	3 categories: no worries about the personal economic situation (reference category); some worries about the personal economic situation; hard worries about the personal economic situation;
Satisfaction with life	Ordinal variable ranging from 0 (not satisfied with life at all) to 10 (very satisfied with life)
Satisfaction with income	Ordinal variable ranging from 0 (not satisfied with income at all) to 10 (very satisfied with income)
	Covariates for 2nd stage of analysis
Period of entry in employment status	4 categories: prior to 1986 (reference category); between January 1986 and July 1988; between August 1988 and July 1994; after July 1994
Industry	11 categories: agriculture; mining; manufacturing (reference category); construction; trade; transportation/communication; banking/insurance; services; non-business organisations; regional authorities/social security; others
Firm size	4 categories: less than 20 employees (reference category); 20 up to 199 employees; 200 up to 1,999 employees; 2,000 and more employees
Occupation	21 categories: scientist; engineer; physician/medical assistant; lawyer/ accountant/educator; past. worker/artist/journalist/author/ sportsman; manager; bookkeeper/cashier; other office worker/ manager; wholesale/retail/sales; sales staff; restaurant trade; domestic occupation; plain services; farmer/fisherman/forestry worker; mining/ wood/ chem. worker; textiles/foodst. worker; metal worker; electrician (ref. category), painter/bricklayer/carpenter; operator, others

Working in trained occupation	4 categories: working in trained occupation (reference category); not working in trained occupation; in training on the job; no occupational degree
No information on current occupation	1: all information an current job (industry, firm size, occupation, training required for occupation, working in trained occupation) is missing; 0: no information on current occupation is missing

Notes: Differences in the definition of variables between the models are reported in the corresponding Tables.

Following the discussion on push and pull-factors (see Chapter 5), a regional unemployment-to-vacancy-ratio (UV-ratio) is included in the estimation to control for the tightness of the labour market. The UV-ratio is calculated on a monthly basis for the federal states using the inflow of unemployed people and the stock of vacant jobs. The pull-hypothesis is tested by using annual GDP growth rates for the federal states.[75] Besides this, dummies for different regions and the interest rate of credits up to one million DM are included.

Finally, to control for unobservable characteristics such as risk-aversion and wish of independence I include worries about the personal economic situation and the satisfaction with income and the general satisfaction with life in both models. All covariates, which are allowed to vary over time are employed as time-varying variables. Only the quarter or period of entry in employment status, gender, employment status of the father, employment status at first job and GSOEP sample are time-invariant covariates.

To assess the stability of employment and the effects of bridging allowance on the stability, the same characteristics used for the estimation of the determinants of the employment status are considered in this case, whereas the IRR and SPIR are time-invariant and fixed to the month of entry. Additionally, job describing characteristics are included, for example industry, number of employees and occupation for the sample of the paid-employed and the required occupational degree, working in trained occupation and "information on job is missing" for both samples. Table 7 provides some descriptive information on these variables.

[75] The UV-ratio and the GDP growth rate proved to approximate demand pull and unemployment push best. Several other measures were also tested, like the unemployment rate, GDP growth on quarterly data, number of insured employees in a certain sector etc.

Table 6: Descriptives of the Unemployment Model for the Sample-All

	Un-employed	Self-employed	Paid-employed	Inactive	Total
Frequency	1.511	239	6.736	1.800	10.286
Share	14.7	2.3	65.4	17.5	100
Process time					
1 month	9.6	14.0	15.6	6.5	10.0
2 months	8.4	14.0	13.5	4.6	8.7
3 months	7.3	9.2	12.5	6.1	7.6
4 months	6.5	8.5	8.5	4.6	6.6
5 months	5.8	4.3	6.9	5.3	5.9
6 months	5.1	7.3	6.2	5.9	5.2
7-9 months	12.7	16.5	12.6	12.7	12.7
10-12 months	9.6	9.8	7.8	16.3	9.6
13-18 months	11.8	6.7	8.6	14.0	11.6
≥19 months	23.1	9.8	7.8	24.0	22.1
Calendar period					
Prior to 86	9.3	9.2	11.8	15.3	9.6
86-88.7	11.4	6.1	12.7	12.5	11.5
88.8-94.7	34.8	32.3	32.8	35.2	34.7
After 94.8	44.5	52.4	42.7	37.1	44.3
Quarter of entry into employment status					
First quarter	36.3	29.3	32.6	35.2	36.1
Second quarter	22.0	22.6	18.8	20.7	21.8
Third quarter	21.6	24.4	24.0	24.1	21.8
Fourth quarter	20.1	23.8	24.7	20.1	20.4
Calendar quarter					
First quarter	24.9	22.0	28.8	21.4	25.1
Second quarter	23.7	22.0	23.3	14.7	23.6
Third quarter	24.9	21.3	25.9	20.6	24.9
Fourth quarter	26.5	34.8	22.0	43.4	26.5
Age < 25	15.5	9.8	28.3	24.4	16.5
25 ≤age < 29	12.0	16.5	16.7	13.3	12.3
30 ≤age < 34	10.9	23.8	14.4	9.2	11.1
35 ≤age < 39	10.8	17.7	12.1	7.5	10.9
40 ≤age < 44	8.7	14.6	9.7	5.6	8.7
45 ≤age < 49	9.7	9.8	8.3	5.4	9.6
50 ≤age < 54	12.0	5.5	6.8	6.4	11.5
55 ≤age < 67	20.5	2.4	3.7	28.4	19.5
No occupational degree	34.8	16.5	25.5	33.9	34.2
Apprenticeship	43.5	35.4	49.4	42.8	43.8
Technical college	12.1	7.9	12.1	13.2	12.1
Master craftsman	5.1	17.7	5.6	6.0	5.2
Higher technical college	0.9	2.4	1.4	1.4	0.9

University degree	3.7	20.1	6.0	2.7	3.9
Foreigner	29.6	9.8	20.6	24.8	28.9
Disabled	10.1	3.1	4.7	13.1	9.8
Female	50.2	37.8	43.0	59.2	49.8
Single	23.7	31.1	38.5	23.6	24.7
Married	64.3	59.8	53.4	67.2	63.6
Not married	12.0	9.2	8.2	9.3	11.7
Children < 16 years	40.9	49.4	45.6	41.0	41.3
Female * no occupational degree	16.8	4.3	10.6	19.7	16.4
Female * apprenticeship	24.3	15.2	21.7	26.9	24.1
Female * technical college	4.8	1.2	4.7	7.1	4.9
Female * master craftsman	2.4	7.3	3.2	3.0	2.4
Female * univ. or hi. tech. coll. deg.	1.9	9.8	2.9	2.6	2.0
Female * single	9.7	11.6	14.5	7.7	10.0
Female * not married	7.6	5.5	4.7	6.5	7.4
Female * married	32.9	20.7	23.8	45.0	32.5
Female * children < 16 years	22.0	17.1	20.4	32.3	22.1
No spouse	30.9	30.5	38.2	29.7	31.4
Spouse full-time employed	35.9	36.6	36.9	43.6	36.1
Spouse part-time employed	4.7	11.6	5.4	3.8	4.7
Spouse unemployed	8.3	7.9	5.5	7.1	8.1
Spouse out-of-labour-force	20.2	13.4	14.1	15.8	19.7
Income of spouse	1.708	2.070	1.623	2.112	1.710
	(-2.14)	(2.46)	(2.12)	(3.10)	(2.16)
Household income	2.932	3.451	3.224	3.131	2.956
	(-1.77)	(-2.23)	(-1.70)	(-2.45)	(-1.78)
Capital income	0.607	0.725	0.564	0.747	0.607
	(-1.96)	(-1.62)	(-2.02)	(-2.03)	(-1.97)
Housing ownership	25.9	35.4	29.2	31.8	26.3
SPIR	1.419	1.180	1.350		1.414
	(-0.56)	(-0.37)	(-0.53)		(-0.55)
IRR	0.350	0.219	0.272		0.345
	(-0.28)	(-0.21)	(-0.28)		(-0.28)
Unemployment benefits	0.878			0.564	0.872
	(-0.71)			(-0.62)	(-0.71)
Father self-employed	5.1	12.2	6.5	6.8	5.3
Employment status of father missing	37.0	22.0	24.7	32.0	36.0
First job self-employed	1.6	3.1	0.6	1.4	1.5
First job white-collar	22.3	37.8	23.5	29.8	22.5
First job blue-collar	65.1	47.0	59.2	54.2	64.5
First job missing	11.1	12.2	16.7	14.7	11.5
Age at first job	1.883	2.018	1.908	1.901	1.886
	(-0.40)	(-0.35)	(-0.32)	(-0.37)	(-0.40)
GSOEP Sample A+E	35.5	48.8	40.4	49.5	36.1
GSOEP Sample B+D	33.2	11.6	24.4	27.5	32.4
GSOEP Sample C	31.3	39.6	35.2	23.1	31.5
Northern federal states	13.3	13.4	13.4	14.8	13.3

North-Rhine Westphalia	19.7	14.6	15.4	20.4	19.4
Middle-western federal states	11.2	13.4	11.0	14.7	11.3
Southern federal states	21.1	18.3	23.6	24.4	21.4
North-eastern federal states	19.8	17.7	20.5	14.3	19.7
South-eastern federal states	14.9	22.6	16.2	11.4	14.9
< 20,000 citizens	39.3	50.0	47.2	40.6	39.9
20,000 ≤citizens < 100,000	26.2	23.2	24.5	24.8	26.1
100,000 ≤citizens < 500,000	18.9	14.0	15.6	18.9	18.6
500,000 ≤citizens	15.7	12.8	12.7	15.7	15.5
Regional UV-ratio	2.317	2.430	2.300	2.366	2.317
	(-1.46)	(-1.39)	(-1.40)	(-1.47)	(-1.45)
Interest rate	10.705	10.855	10.639	10.572	10.698
	(-1.50)	(-1.40)	(-1.50)	(-1.53)	(-1.50)
GDP growth rate	3.084	3.438	3.332	2.786	3.096
	(-2.99)	(-3.44)	(-2.99)	(-2.79)	(-2.99)
Hard worries about eco. situation	50.4	36.0	44.0	36.6	49.7
Some worries about eco. situation	39.1	47.6	45.4	45.0	39.6
No worries about eco. situation	10.5	16.5	10.6	18.4	10.7
Satisfaction with life	5.825	6.402	6.142	6.418	5.858
	(-2.22)	(-2.01)	(-2.14)	(-2.16)	(-2.22)
Satisfaction with income	4.371	4.768	4.886	5.172	4.420
	(-2.57)	(-2.75)	(-2.57)	(-2.64)	(-2.58)

Notes: (i) Statistics are the means of the exogenous variables obtained from waves 1-16 of the GSOEP. (ii) Standard deviations of continuos variables in parenthesis. (iii) For the definition of the variables see Table 5.

The effects of bridging allowance on employment stability are measured in terms of the date of entrance in self-employment and paid-employment, respectively. The same calendar periods of legal changes in bridging allowance as in the analysis of employment determinants are applied in this case. A possible shortcoming of this measure is that it may capture only time effects instead of effects of bridging allowance. Unfortunately, time is the only measurable factor in the GSOEP to distinguish between different periods of legal arrangement of bridging allowance. Furthermore, the inclusion of time-varying macroeconomic variables like the UV-ratio or GDP growth-rate should account for time effects.

Table 7: Descriptives of the Employment Models for the Sample-All

	Paid-employed				Self-employed			
	Em-ployed	Unem-ployed	In-active	Total	Em-ployed	Unem-ployed	In-active	Total
Frequency	2.689	3.303	744	6.736	170	48	21	239
Share	39.9	49.0	11.1	100	71.1	20.1	8.8	100
Process time								
1-3 months	11.3	18.5	9.7	11.4	14.8	17.2	0.0	14.8
4-6 months	9.4	17.7	14.4	9.6	12.2	34.5	0.0	12.3
7-9 months	7.7	20.1	10.0	8.0	10.0	6.9	27.3	10.0
10-12 months	6.1	14.2	7.2	6.3	9.2	17.2	9.1	9.2
13-18 months	9.8	10.3	10.2	9.8	14.7	10.3	27.3	14.7
19-24 months	7.9	5.3	8.4	7.9	39.1	13.8	36.4	39.0
25-30 months	6.5	3.3	7.0	6.5				
31-36 months	5.6	3.3	5.1	5.6				
37-48 months	9.0	3.1	6.5	8.9				
49-60 months	6.5	1.3	8.1	6.4				
≥61 months	20.1	2.9	13.5	19.8				
Period of entry into employment								
Prior to 86	19.0	11.7	17.4	18.9	10.9	13.8	18.2	10.9
86-88.7	21.2	13.1	22.0	21.0	17.4	13.8	9.1	17.3
88.8-94.7	35.3	37.4	37.1	35.3	42.6	27.6	63.6	42.6
After 94.8	24.6	37.8	23.4	24.8	29.1	44.8	9.1	29.2
Quarter of entry into employment status								
First quarter	29.4	27.2	26.9	29.4	40.6	31.0	45.5	40.6
Second quarter	28.6	35.8	29.7	28.7	27.4	27.6	27.3	27.4
Third quarter	21.7	19.3	22.7	21.6	16.5	20.7	18.2	16.5
Fourth quarter	20.3	17.7	20.7	20.3	15.6	20.7	9.1	15.6
Calendar quarter								
First quarter	22.4	19.1	25.1	22.3	23.1	20.7	27.3	23.1
Second quarter	24.9	17.1	16.2	24.7	24.5	20.7	27.3	24.4
Third quarter	26.1	22.4	26.0	26.0	25.7	20.7	27.3	25.7
Fourth quarter	26.7	41.4	32.7	27.0	26.8	37.9	18.2	26.8
Age < 25	17.2	21.1	27.4	17.3	4.6	13.8	9.1	4.6
25 ≤age < 29	18.7	14.9	22.5	18.6	13.9	13.8	36.4	14.0
30 ≤age < 34	16.7	15.3	11.8	16.7	20.5	17.2	9.1	20.5
35 ≤age < 39	14.8	13.1	7.0	14.8	18.4	17.2	27.3	18.4
40 ≤age < 44	11.0	10.0	10.7	11.0	17.2	3.5	18.2	17.2
45 ≤age < 49	9.0	9.7	5.3	9.0	13.4	24.1	0.0	13.4
50 ≤age < 54	7.7	9.0	4.9	7.7	7.3	6.9	0.0	7.3
55 ≤age < 67	4.9	6.9	10.4	5.0	4.7	3.5	0.0	4.7
No occupational degree	21.6	24.7	26.5	21.7	13.2	31.0	18.2	13.3
Apprenticeship	48.9	52.1	46.2	49.0	37.7	24.1	27.3	37.6

Technical college	13.2	11.6	14.9	13.2	8.6	6.9	9.1	8.6
Master craftsman	6.8	5.4	6.3	6.8	20.0	20.7	27.3	20.0
Higher technical college	2.1	0.7	1.4	2.1	1.7	3.5	0.0	1.7
University degree	7.3	5.6	4.9	7.3	18.9	13.8	18.2	18.8
Agriculture	2.0	4.6	1.6	2.1	4.0	0.0	0.0	4.0
Mining/energy	0.9	0.8	0.3	0.9				
Manufacturing	31.3	23.4	30.0	31.2	10.2	9.1	18.2	10.2
Construction	13.6	22.1	14.8	13.7	12.0	13.6	0.0	12.0
Trade	14.1	10.8	12.6	14.0	23.7	18.2	27.3	23.7
Transportation/ communic.	4.6	3.8	3.5	4.6	3.3	18.2	0.0	3.4
Banking/insurance	1.8	0.5	1.3	1.8	8.3	0.0	0.0	8.2
Services	18.3	17.7	23.3	18.3	34.2	31.8	45.5	34.2
Non-business organisations	2.8	3.4	3.8	2.8	0.9	0.0	9.1	1.0
Regional authorities/social security	5.6	8.9	3.8	5.6	1.5	0.0	0.0	1.5
Others	5.0	4.0	5.1	5.0	1.9	9.1	0.0	2.0
< 20 employees	31.4	39.9	30.3	31.4				
20-199 employees	33.6	36.2	36.9	33.6				
200-1999 employees	21.9	15.9	19.9	21.8				
≥2000 employees	13.2	8.0	12.9	13.1				
Scientist	2.7	1.2	1.9	2.7	4.2	0.0	0.0	4.2
Engineer	3.6	2.3	3.2	3.5	2.9	0.0	9.1	2.9
Physician/medical assistant	2.1	0.4	3.2	2.1	9.1	4.6	9.1	9.1
Lawyer/accountant/educator	2.2	2.0	3.8	2.2	0.4	0.0	0.0	0.4
Past. worker/artist/journ./ author/sportsman	3.1	3.4	2.5	3.1	7.9	9.1	9.1	7.9
Manager	2.9	1.1	0.6	2.8	9.8	13.6	0.0	9.8
Bookkeeper/cashier	7.7	5.8	8.5	7.7	0.7	4.6	9.1	0.7
Other office worker/manager	8.8	5.6	8.2	8.8	1.1	9.1	0.0	1.2
Wholesale/retail/sales	2.2	1.0	1.9	2.2	9.4	4.6	18.2	9.4
Sales staff	6.8	6.2	6.0	6.8	14.0	13.6	9.1	14.0
Restaurant trade	2.3	4.1	3.8	2.3	9.7	9.1	18.2	9.7
Domestic occupation	1.3	1.8	1.6	1.4				
Plain services	6.4	5.5	10.1	6.4	4.7	0.0	9.1	4.7
Farmer/fisherman/forestry worker	1.8	5.3	1.3	1.8	4.0	0.0	0.0	4.0
Mining/wood/chem. worker	5.1	6.1	4.4	5.1	2.4	0.0	0.0	2.4
Textiles/foodstuff worker	3.1	1.9	2.5	3.1	3.0	0.0	0.0	3.0
Metal worker	9.9	5.6	6.9	9.9	2.5	0.0	0.0	2.4
Electrician	2.6	1.8	3.2	2.6	2.9	0.0	0.0	2.9
Painter/bricklayer/carpenter	11.2	22.2	12.9	11.4	7.0	4.6	0.0	7.0
Operator	13.6	16.4	12.9	13.6	4.2	27.3	9.1	4.3
Others	0.6	0.2	0.6	0.6				
No occupational training required	6.5	13.0	10.1	6.6	9.1	31.8	18.2	9.2

Brief training on the job required	18.1	26.6	19.2	18.2	3.2	0.0	18.2	3.2
Longer training on the job required	15.3	15.0	14.2	15.3	7.4	22.7	18.2	7.5
Training off the job required	5.7	5.1	6.0	5.7	15.5	13.6	0.0	15.4
Occupational degree required	46.6	35.6	47.3	46.4	50.4	22.7	36.4	50.3
University or hi. tech. coll. deg. required	7.8	4.7	3.2	7.7	14.4	9.1	9.1	14.4
Working in trained occupation	43.4	33.7	44.2	43.3	50.8	22.7	54.6	50.7
Not working in trained occupation	45.8	52.6	45.1	45.9	44.4	68.2	36.4	44.5
In training on the job	0.9	0.7	0.3	0.9	1.2	0.0	0.0	1.2
No occupational degree	9.8	13.0	10.4	9.9	3.7	9.1	9.1	3.7
No information on the current job	9.5	43.3	26.5	10.2	5.0	24.1	0.0	5.1
Foreigner	21.5	20.2	18.8	21.5	6.3	17.2	9.1	6.4
Disabled	4.4	5.7	8.1	4.4	4.1	3.5	0.0	4.1
Female	40.6	40.0	55.9	40.7	32.1	41.4	72.7	32.3
Single	31.5	33.0	30.4	31.5	27.2	34.5	27.3	27.2
Married	59.9	57.3	62.2	59.8	64.6	58.6	63.6	64.6
Not married	8.6	9.7	7.4	8.7	8.2	6.9	9.1	8.2
Children < 16 years	42.9	44.3	43.9	43.0	48.9	48.3	27.3	48.9
Female * no occupational degree	8.9	9.0	16.0	8.9	4.6	3.5	18.2	4.7
Female * apprenticeship	19.9	21.7	24.1	20.0	11.5	13.8	27.3	11.5
Female * technical college	5.6	3.9	9.1	5.6	1.0	0.0	0.0	1.0
Female * master craftsman	3.0	2.9	3.9	3.0	5.7	13.8	18.2	5.8
Female * hi. tech. coll. deg.	0.7	0.4	0.7	0.7	1.5	3.5	0.0	1.5
Female * university degree	2.5	2.2	2.1	2.4	7.8	6.9	9.1	7.8
Female * single	12.4	11.6	14.6	12.4				
Female * not married	5.3	4.8	4.9	5.3				
Female * married	22.9	23.5	36.4	23.0	19.3	17.2	63.6	19.3
Female * children < 16 years	15.2	18.4	27.8	15.3	11.9	6.9	27.3	11.9
No spouse	32.6	35.2	30.9	32.7	26.8	37.9	27.3	26.9
Spouse full-time employed	37.7	36.9	45.9	37.7	34.7	20.7	54.6	34.7
Spouse part-time employed	9.2	5.9	5.8	9.2	18.7	17.2	0.0	18.7
Spouse unemployed	4.0	5.4	3.3	4.0	6.3	6.9	0.0	6.3
Spouse out-of-labour-force	16.5	16.6	14.2	16.5	13.4	17.2	18.2	13.4
Income of spouse	1.622	1.407	2.128	1.620	2.061	0.983	3.088	2.057
	(2.37)	(1.74)	(5.21)	(2.38)	(2.97)	(1.25)	(3.15)	(2.96)
Household income	3.851	3.187	3.479	3.837	4.126	3.129	3.621	4.119
	(1.96)	(2.03)	(1.68)	(1.96)	(2.51)	(1.74)	(2.17)	(2.51)
Capital income	0.630	0.496	0.530	0.627	0.855	0.414	0.500	0.852
	(1.73)	(1.11)	(0.89)	(1.72)	(1.76)	(0.53)	(0.74)	(1.75)
Housing ownership	31.2	30.6	30.6	31.2	50.2	20.7	9.1	49.9

SPIR	1.371	1.371	1.448	1.371	1.199	1.245	1.551	1.200
	(0.53)	(0.54)	(0.52)	(0.53)	(0.33)	(0.28)	(0.30)	(0.33)
IRR	0.301	0.313	0.289	0.301	0.248	0.263	0.216	0.248
	(0.28)	(0.28)	(0.33)	(0.28)	(0.19)	(0.24)	(0.20)	(0.19)
Father self-employed	6.7	7.5	7.0	6.7	16.9	0.0	18.2	16.8
Employment status of father missing	22.9	26.0	24.1	23.0	23.1	27.6	9.1	23.1
First job self-employed	0.6	0.7	0.9	0.6				
First job white-collar	27.7	20.7	28.1	27.6	41.6	34.5	54.6	41.6
First job blue-collar	59.3	63.8	53.1	59.4	48.9	51.7	18.2	48.9
First job missing	12.4	14.8	17.9	12.5	9.5	13.8	27.3	9.6
Age at first job	1.910	1.891	1.912	1.909	2.021	1.883	1.964	2.020
	(0.32)	(0.35)	(0.31)	(0.32)	(0.36)	(0.25)	(0.24)	(0.36)
GSOEP Sample A+E	51.2	38.3	55.5	51.0	57.8	41.4	54.6	57.7
GSOEP Sample B+D	24.8	22.9	23.2	24.7	7.7	20.7	18.2	7.8
GSOEP Sample C	24.0	38.8	21.4	24.3	34.5	37.9	27.3	34.5
Northern federal states	14.3	12.9	16.5	14.3	13.1	10.3	0.0	13.0
North-Rhine Westphalia	20.6	13.5	20.2	20.5	15.7	24.1	36.4	15.8
Middle-western federal states	12.6	10.5	12.5	12.6	13.7	6.9	36.4	13.7
Southern federal states	27.2	23.2	29.5	27.1	24.7	17.2	9.1	24.6
North-eastern federal states	14.3	22.2	13.0	14.4	13.1	24.1	0.0	13.2
South-eastern federal states	11.1	17.8	8.4	11.2	19.7	17.2	18.2	19.7
< 20,000 citizens	42.5	51.4	42.2	42.7	49.3	27.6	54.6	49.2
20,000 ≤citizens < 100,000	27.1	23.4	26.2	27.0	28.2	37.9	18.2	28.2
100,000 ≤citizens < 500,000	15.6	14.4	16.7	15.5	13.2	13.8	9.1	13.2
500,000 ≤citizens	14.9	10.8	14.9	14.8	9.3	20.7	18.2	9.4
Regional UV-ratio	1.912	2.399	2.064	1.922	2.030	2.369	2.370	2.032
	(1.13)	(1.35)	(1.32)	(1.14)	(1.25)	(1.24)	(2.38)	(1.25)
Interest rate	10.671	10.622	10.631	10.670	10.712	10.710	10.281	10.711
	(1.44)	(1.40)	(1.49)	(1.44)	(1.33)	(1.28)	(0.82)	(1.33)
GDP growth rate	2.798	3.159	2.641	2.804	2.807	3.382	2.100	2.809
	(2.55)	(2.91)	(2.43)	(2.56)	(2.72)	(3.08)	(1.40)	(2.72)
Hard worries about eco. sit.	26.3	43.7	31.3	26.6	22.9	37.9	36.4	23.0
Some worries about eco. sit.	53.8	46.5	50.8	53.6	60.9	48.3	63.6	60.9
No worries about eco. sit.	19.9	9.9	17.9	19.7	16.2	13.8	0.0	16.2
Satisfaction with life	6.752	6.078	6.650	6.739	6.613	5.862	7.364	6.611
	(1.84)	(2.12)	(2.16)	(1.85)	(1.89)	(1.98)	(1.43)	(1.89)
Satisfaction with income	5.873	4.867	5.529	5.853	5.772	5.862	6.818	5.768
	(2.30)	(2.58)	(2.52)	(2.31)	(2.46)	(1.98)	(1.78)	(2.46)

Notes: (i) Statistics are the means of the exogenous variables obtained from waves 1-16 of the GSOEP. (ii) Standard deviations of continuos variables in parenthesis. (iii) For the definition of the variables see Table 5.

Figure 5 provides the empirical hazard to leave unemployment for the different exit states. Relative to the first month of unemployment the risk of becoming either self- or paid-employed is steadily decreasing, even if the graphs are fluctuat-

ing a little. In contrast, the relative hazard of inactivity is nearly constant over time, fluctuating around zero, with peaks after 12 and 24 months of unemployment duration. This may reflect the end of the entitlement period for unemployment benefits. For the second stage of the analysis we find survival rates in employment among those initially entering self-employment being higher over the total process time compared to the survival rates among those initially entering paid-employment (see Figure 6). After ten years around 50% of the initially self-employed are still in employment, whereas only 20% of the paid-employed are still working at that point of time.

Figure 5: Empirical Hazard Rates from Unemployment for the Sample-All

Notes: (i) Kaplan-Meier hazard rates obtained from waves 1-16 of the GSOEP. (ii) Hazard rates are relative to the first month of process time.

Figure 6: Empirical Survival Rates in Employment for the Sample-All

Note: Kaplan-Meier survival rates obtained from waves 1-16 of the GSOEP.

6.5 Econometric Results

6.5.1 Choice of the Number of Mass Points

Table 8 shows the values of the three IC for all models estimated. The figure in bold letters indicates the model with the appropriate number of mass points, which yields the lowest value for the respective IC.

For both samples (Sample-All and Sample-West), an unemployment duration model with 3 mass points is proved to approximate the distribution of the individual heterogeneity best. For the Sample-All this result is quite clear, whereas for the Sample-West the AIC proposed four mass points. But as stated in the Section 6.2.2, the model, which is preferred according to at least two IC, is used. Estimation of the stability of employment among the initially self-employed is done within a model without unobserved heterogeneity. This is the case for both samples. Finally, for those initially entering paid-employment, employment duration is modelled within a model of three mass points for the Sample-All and a model of two mass points for the Sample-West, respectively.

From Table 8 it can also be seen that the AIC tends to overestimate the appropriate number of mass points. With the exception of the estimation of employment stability among the initially paid-employed the HQIC and the BIC always lead to the same choice of model.

Table 8: Choice of the Number of Mass Points for the Different Models

Number of mass points	Number of parameters	Log likelihood	HQIC	BIC	AIC
Exit of unemployment for Germany (N = 70,555)					
0	185	-22,058.104	-22,504.455	-23,090.788	-22,243.104
2	187	-21,965.826	-22,417.002	-23,009.674	-22,152.826
3	189	-21,935.996	**-22,391.998**	**-22,991.008**	**-22,124.996**
4	191	-21,934.816	-22,395.643	-23,000.992	-22,125.816
Exit of unemployment for West Germany (N = 48,499)					
0	160	-14,889.447	-15,270.016	-15,752.591	-15,049.447
2	162	-14,829.182	-15,214.508	-15,703.115	-14,991.182
3	164	-14,811.700	**-15,201.783**	**-15,696.422**	-14,975.700
4	166	-14,809.517	-15,204.357	-15,705.029	**-14,975.517**
Employment stability among initially self-employed for Germany (N = 5,626)					
0	38	-189.167	**-271.089**	**-353.235**	**-227.167**
2	40	-189.167	-275.401	-361.870	-229.167
3	42	-189.167	-279.713	-370.506	-231.167
4	44	-189.167	-284.024	-379.141	-233.167
Employment stability among initially self-employed for West Germany (N = 3,789)					
0	36	-119.810	**-195.733**	**-268.127**	-155.810
2	38	-117.357	-197.498	-273.914	**-155.357**
3	40	-116.044	-200.403	-280.841	-156.044
4	42	-116.044	-204.621	-289.081	-158.044
Employment stability among initially paid-employed for Germany (N = 108,263)					
0	93	-10,256.263	-10,484.145	-10,795.306	-10,349.263
2	95	-10,239.828	-10,472.611	**-10,790.463**	-10,334.828
3	97	-10,234.658	**-10,472.341**	-10,796.885	**-10,331.658**
4	99	-10,234.262	-10,476.846	-10,808.082	-10,333.262
Employment stability among initially paid-employed for West Germany (N = 83,446)					
0	79	-6,960.578	-7,152.361	-7,408.190	-7,039.5781
2	81	-6,945.351	**-7,141.989**	**-7,404.296**	-7,026.3514
3	83	-6,942.508	-7,144.001	-7,412.784	**-7,025.508**
4	85	-6,942.508	-7,148.856	-7,424.116	-7,027.508

Note: FIML estimation of the multinomial logit model with non-parametrically distributed heterogeneity on the basis of Waves 1-16 of the GSOEP.

6.5.2 Determinants of Self-Employment

In this section, I will discuss the estimates of the determinants of self-employment, paid-employment and dropping out-of-labour-force. The focus of the discussion is based on the characteristics derived from economic theory (see Chapter 5). These and the other estimates for the Sample-All are documented in Table 9.[76] For the

[76] The further discussion of Section 6.5 is concentrated on the results for the Sample-All. Results for the Sample-West are similar. The interested reader is referred to Table 43 and Tables 45 to 50 in Appendix A.2.

sake of efficiency and consistency only variables, which proved to be significant at the 10% level are included in the estimation.[77]

The IIA assumption cannot be rejected for the three choices for the model without unobserved heterogeneity.[78] Whereas the Hausman test is a valid procedure for the states of self-employment and inactivity, respectively, it produces a negative test statistic for the state of paid-employment. Therefore, the Small-Hsiao test is used instead. The two Hausman tests yield a very small test statistic with a corresponding probability value (p-value) of one. The Small-Hsiao test is not that clear, but with a p-value of 18.5% well above the critical value of 10%.

The population can be divided into three different groups of heterogeneity. The effect of the first mass point is -1.355 on the overall hazard rate. The population group has a relatively high unobserved attitude of staying unemployed. However, the probability of belonging to this group is with 6.9% relatively small. The highest probability of 74.7% corresponds also to a negative impact on the hazard rate of -0.218. Finally, those people with unobserved characteristics favouring the hazard from unemployment account for 18.4% of the population.

The probability of entering self-employment is not stable over the process time, i.e. over unemployment duration. During the first five months of unemployment duration the baseline hazard rate changes only slightly. Then, between six and twelve months of unemployment duration the transition into self-employment becomes more likely. Another peak in the probability of leaving unemployment for self-employment can be found for a process time of 19 months and longer. This transition pattern may arise from the fact that bridging allowance is a non-refundable grant, which prolongs the entitlement period by six months (see Section 2.3.1). Thus, it is likely that some unemployed enter self-employment, i.e. receive bridging allowance, relatively late during process time and close to the end of their entitlement period.

In contrast to this result, Bryson and White (1996) find that the entry into self-employment depends negatively on the duration of unemployment. Their result, however, might be due to the fact that they do not control for unobserved heterogeneity. Not controlling for population heterogeneity can result in downwards biased estimates of the baseline hazard rate (see Steiner, 1994).

The hazard rate for exits into paid-employment remains almost stable along unemployment duration. Therefore, a negative duration dependence can neither be found for transitions into self-employment nor for transitions into paid-employment. In contrast, transitions into paid-employment are slightly more likely during the second and the 18th month of unemployment duration than during the first. The only exception from this pattern can be found for a process time of over 18 months, where the hazard rate is significantly lower than for a process time of one month. This result clearly indicates the importance of controlling for unob-

[77] To save time of computation, the testing of the significance of specific variables was done within the model of no unobserved heterogeneity. For the exit into self-employment a significance level of 20% is used, because of the relative small number of observations for this state.

[78] See Table 44 in the Appendix A.2.

served heterogeneity. An estimation without individual heterogeneity yields a negative duration dependence for transitions into paid-employment.[79] Therefore, with the exception of the long-term unemployed, the observed negative duration dependence for transitions into paid-employment as well as into self-employment (see the Section 6.4.3) reflects low re-employment chances for specific groups of unemployed people, instead of declining re-employment opportunities during unemployment duration due to stigmatisation or deterioration of human capital (see Steiner, 2001). Such a sorting mechanism leads to a declining probability of leaving unemployment, at constant individual hazard rates over process time, as those individuals with high employment opportunities quit unemployment quickly, leaving back those with bad opportunities. In my estimation, the latter group is represented by the heterogeneity group one (see μ^1 in Table 9) and the former by group two (see μ^2).

If there is stigmatisation then only for the long-term unemployed through potential employers, but not for those entering self-employment. For the self-employed such stigmatisation can only occur through customers or credit institutions. The latter may be revealed as liquidity constraints (see Battistin et al., 2001). Whereas discrimination through customers is more or less unlikely, liquidity constraints are well documented in literature (see e.g. Blanchflower and Oswald, 1998 or Johansson, 2000). Therefore, the stable or even increasing hazard rate into self-employment over process time can be an indicator of lowered capital constraints due to the subsidisation with bridging allowance and not only an indicator of opportunistic behaviour.

Transitions into inactivity show the widely known positive duration dependence, i.e. long-term unemployed people being discouraged or dropping out-of the unemployment benefits system more likely leave the labour force than the short-term unemployed.

To conclude the discussion on process time Figure 7 shows the estimated relative hazard rates compared to the first month of unemployment duration. We can see that the hazard rates into self- and paid-employment, respectively, are very similar. Both hazard rates are declining compared to the first month with increased process time, whereas the self-employment hazard is almost all a little bit higher. In particular, between six and twelve months of unemployment duration the hazard of becoming self-employed is relatively high. It is even higher than for the first month. Thus, controlling for both, observed as well as unobserved characteristics, yields a partly positive duration dependence, which is in contrast to the descriptive results of the previous section. This finding may indicate, the negative influence of the unobserved heterogeneity on the hazard rate, which leads to an downwards biased estimate of the hazard rate if neglected. For the hazard of paid-employment only a small peak at three months of unemployment duration is found.

[79] For the estimation results neglecting unobserved heterogeneity see Table 44 in Appendix A.2.

In contrast to the exits into the employment states the relative hazard rate of inactivity rises sharply between the first twelfth month of unemployment duration, to become relatively stable, but still at a high level, for a longer duration.

Table 9: Competing Risks Model for the Exit of Unemployment

	Self-employment		Paid-employment		Inactivity	
	Coeffi-cient	Standard Error	Coeffi-cient	Standard Error	Coeffi-cient	Standard Error
Process time						
2 months	0.365	0.300	0.112	0.061	-0.032	0.179
3 months	0.274	0.337	0.300	0.064	0.497	0.167
4 months	0.457	0.346	0.183	0.072	0.417	0.183
5 months	-0.001	0.438	0.173	0.077	0.773	0.176
6 months	0.744	0.365	0.286	0.081	1.075	0.173
7-9 months	0.865	0.297	0.222	0.069	1.057	0.149
10-12 months	0.743	0.339	0.202	0.079	1.622	0.147
13-18 months	0.384	0.380	0.225	0.081	1.574	0.151
≥19 months	0.582	0.349	-0.176	0.090	1.621	0.149
Calendar period						
86-88.7			-0.239	0.075	-0.350	0.120
88.8-94.7			-0.450	0.074	-0.167	0.103
After 94.8			-0.582	0.080	-0.440	0.108
Quarter of entry into employment status						
Second quarter			-0.069	0.052	-0.013	0.089
Third quarter			0.092	0.050	0.161	0.087
Fourth quarter			0.287	0.049	0.148	0.091
Calendar quarter						
Second quarter	0.277	0.241	-0.091	0.048	-0.266	0.100
Third quarter	0.170	0.243	0.021	0.048	-0.003	0.092
Fourth quarter	0.537	0.218	-0.249	0.048	0.604	0.080
14 ≤age < 25	-0.771	0.386	0.392	0.078	1.063	0.150
25 ≤age < 30	-0.071	0.294	0.208	0.072	0.467	0.145
30 ≤age < 35	0.336	0.259	0.166	0.070	0.176	0.152
40 ≤age < 45	0.073	0.289	-0.059	0.077	0.055	0.172
45 ≤age < 50	-0.435	0.336	-0.346	0.084	-0.036	0.181
50 ≤age < 67	-2.002	0.382	-1.290	0.085	0.496	0.146
No occupational deg.	0.365	0.320	-0.262	0.055	-0.117	0.123
Technical college	0.249	0.366	0.019	0.066	0.114	0.157
Master craftsman	1.574	0.323	0.112	0.086	0.550	0.204
University/hi. tech. college degree	0.733	0.351	0.208	0.083	-0.630	0.262
Foreigner			-0.238	0.089		
Disabled	-1.126	0.467	-0.502	0.086	0.231	0.104
Female	-0.600	0.404	-0.567	0.077	-0.554	0.144
Single	-0.195	0.336	-0.219	0.080	-0.219	0.134

Not married	-0.475	0.460	-0.303	0.111	-0.295	0.200
Children < 16 years	0.303	0.258	0.023	0.058	-0.639	0.125
Female * no occupational degree	-0.568	0.530			0.106	0.153
Female * technical college	-1.181	0.826			0.117	0.207
Female * master craftsman	-0.369	0.486			-0.435	0.280
Female * university/ hi. tech. coll. degree	0.449	0.462			0.915	0.329
Female * single	0.721	0.419	0.553	0.093	-0.571	0.170
Female * not married	0.924	0.600	0.517	0.143	0.184	0.245
Female * children < 16 years	-0.955	0.372	-0.347	0.082	1.223	0.150
Spouse full-time employed	-0.198	0.280	0.056	0.081		
Spouse part-time employed	0.613	0.371	0.235	0.105		
Spouse unemployed	0.151	0.383	-0.201	0.094		
Spouse out-of-labour-force	-0.060	0.340	0.011	0.078		
Income of spouse			-0.025	0.015	0.025	0.014
Household income	0.074	0.031	0.053	0.009		
SPIR	-0.379	0.221	-0.081	0.043		
IRR	-2.655	0.419	-1.463	0.080		
Unemployment benefits					-0.975	0.062
Father self-employed	0.600	0.264	0.088	0.080		
Employment status of father missing	0.268	0.225	0.034	0.053		
First job self-employed	0.985	0.513	-0.511	0.227	-0.130	0.278
First job white-collar	0.535	0.216	0.035	0.054	0.265	0.087
First job missing	0.172	0.292	0.058	0.060	0.214	0.103
Age at first job	2.904	2.121			1.315	0.400
Age at first job squared	-0.572	0.471			-0.238	0.079
GSOEP Sample B+D	-1.241	0.306	-0.187	0.089	-0.625	0.089
GSOEP Sample C	0.249	0.228	0.584	0.108	-0.059	0.178
Northern fed. states			0.159	0.075	0.064	0.113
Middle-west. fed. st.			0.024	0.078	0.248	0.113
Southern fed. states			0.148	0.068	0.298	0.100
North-east. fed. st.			0.112	0.109	-0.026	0.174
South-east. fed. st.			-0.030	0.121	0.054	0.207

20,000 ≤citizens < 100,000	-0.049	0.207	-0.075	0.049		
100,000 ≤citizens < 500,000	-0.596	0.250	-0.211	0.056		
500,000 ≤citizens	-0.407	0.261	-0.117	0.066		
Regional UV-ratio			-0.160	0.017		
GDP growth rate	0.046	0.030	0.020	0.008	-0.033	0.014
Some worries about economic situat.	0.371	0.189	0.160	0.040	0.296	0.074
No worries about economic situation	0.747	0.269	0.044	0.066	0.524	0.103
Satisfaction with life	0.155	0.045	0.039	0.010	0.043	0.017
Satisfaction with income			0.062	0.008	0.063	0.015
Constant	-10.043	2.411	-1.834	0.189	-6.854	0.551
μ^1	-1.355					0.220
μ^2	1.393					0.084
μ^3	-0.218					-
q^1	0.069					0.031
q^2	0.184					0.029
q^3	0.747					-
Hausman/ Small-Hsiao test	χ^2 (58) = 0.91		χ^2 (67) = 77.21		χ^2 (60) = 9.52	
Log likelihood			-21,935.996			
Number of obs.			70,555			
Wald test			χ^2(182) = 3,349.45			

Notes: (i) FIML estimation of the multinomial logit model with non-parametrically distributed heterogeneity on the basis of Waves 1-16 of the GSOEP. (ii) Reference categories for dummy variables are: 1 month of process time, calendar period prior to 1986, first quarter of entry into employment status, first calendar quarter, 35 ≤age < 40, apprenticeship, married, no spouse, father not self-employed, first job blue-collar, GESOEP Sample A and E, North-Rhine Westphalia, citizens < 20,000, hard worries about economic situation.

Calendar time has no effect on the transition to self-employment. This result is somewhat surprising, as we expected to find an increased hazard rate at least for the period after July 1994. There might be two factors causing this result. First, the sharp increase in the grant of bridging allowance after July 1994 (see Section 2.3) is completely determined by other variables than calendar time. However, this hypothesis seems hardly verifiable, as bridging allowance was increased for all unemployed and not for a specific group. Therefore, calendar time effects should still be present. For that reason, the insignificance of calendar time on the transition into self-employment may simply be a result of the small number of observations. Transitions into paid-employment and into inactivity are most likely prior to the year 1986.

Figure 7: Relative Hazard Rates

Notes: (i) Simulations for the sample means based on the estimates reported in Table 9. (ii) Hazard rates are relative to the first month of unemployment duration.

The age profile for unemployed people becoming self-employed is similar to the age profile of wage workers becoming self-employed (see e.g. Evans and Leighton, 1990). Most unemployed people enter self-employment at the age between 30 and 45 years, whereas people younger than 25 or older than 50 are less likely to enter self-employment. Younger people might not enter self-employment because of lower endowment with human capital and older unemployed are likely to drop out of the labour force due to early retirement regulations. This is also confirmed by the coefficients for the hazard of inactivity. The high probability of becoming inactive for young people at an age of under 25 is probably a result of entering full-time education. Considering the entrants into paid-employment, the hazard rate is declining with age, which is a typical pattern found by other studies (e.g. Hunt, 1995).

Regarding the effects of education, one can find evidence against the discrimination theory. The transition to self-employment is more likely for unemployed persons with higher qualifications, especially among master craftsman, and also among unemployed with higher technical college or university degree, but to a lesser extent. Moreover, this shows that human capital is an important determinant of self-employment not only among former wage workers (see Pfeiffer and Reize, 1999b) but also among the unemployed.[80] Higher education also favours the tran-

[80] Part of this effect may be due to legal requirements according to the German economic and trade regulations. In the craft sector as well as in some professional occupations (for example lawyer, doctor) special examinations or vocational degrees, and in the banking and insurance sector some minimum requirements with respect to ini-

sition to paid-employment, but the coefficients are smaller than those for the transition to self-employment. Finally, people who drop out of the labour force have more often a degree as a master craftsman and less often a university or higher technical college degree than an apprenticeship.

In general, females face a low probability of leaving unemployment. Furthermore, for women the occupational degree has hardly any influence on the transitions into self- and paid-employment. In contrast, the probability of transitions into inactivity is reduced for women being master craftswomen and is increased for women with a university degree. It should be well noted that this impact is reversed compared to the sample of men.

The marital status as well as the prevalence of children younger than 16 have hardly any influence on the probability of leaving unemployment. The only exception is the higher probability of becoming paid-employed among married people. However, the mobility of women is strongly affected by the marital status and having children. Hence, unmarried women, single or not married (i.e. divorced or widowed), are more likely to leave unemployment for employment compared to married females. In particular, this is the case for transitions into self-employment. Moreover, single women are less likely to drop out of the labour force. The prevalence of dependent children, reduces the probability of women entering an occupation, especially self-employment, whereas it favours transitions into inactivity. Therefore, the typical patterns of labour market mobility of married women, are also found among the unemployed and for transitions into self-employment. These patterns are even more distinct for the entrance into self-employment compared to the entrance into paid-employment.

The labour market status of the spouse has only a minor influence on transitions out of unemployment. Part-time employment of the spouse has a positive effect on the probability of becoming self-employed, whereas unemployment of the spouse reduces the probability of getting a job as a dependent employee. The labour market status of the spouse has no impact on transitions into inactivity.

The impacts of financial endowment yield no clear picture for the transitions to self-employment. According to the theory of unemployment duration, one would expect that unemployment duration is prolonged as the unemployed can rely on assets. However, higher assets will also favour the transition into self-employment, at least when capital constraints are existent (see Blanchflower and Oswald, 1998). These opposing effects could be the reason why neither income of the spouse nor capital income nor housing ownership have a significant effect on the risk of becoming self-employed. Only a higher household income favours the transition into self-employment. In fact this could be an indication of the prevalence of the aforementioned capital constraints. The income of the spouse has a negative effect on the transition probability for entrants into paid-employment, while household income has a positive effect on that risk. Besides, the income of

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tial capital, are a necessary precondition for becoming self-employed. However, in principle everybody is allowed to start a business in most parts of the private sector of the economy.

the spouse has a positive impact on the probability of becoming economically inactive.

As assumed, the SPIR has a weakly significant negative effect on the transition to paid-employment. Surprisingly, this negative effect can also be found for the hazard of leaving into self-employment. However, the coefficient is only significant at the 10% level, too. Nevertheless, a higher SPIR reduces the overall hazard from unemployment, i.e. forces individuals to stay unemployed. This result requires some explanation. Why should a higher expected income from self-employment compared to an expected income from wage work reduce the probability of becoming self-employed? Regarding the coefficient of the IRR it becomes clear, which factor mainly determines transitions between the different labour market states. The coefficients of the IRR are much larger than those for the SPIR. Hence, transitions from unemployment to self-employment are only present for a very low IRR. This is also true for transitions to paid-employment but to a much lesser extent. Therefore, the alternative of unemployment seems to be more important than the alternative of paid-employment for those who are considering becoming self-employed. Thus, doubling the expected income would result in a nearly 10 times higher relative chance of entering self-employment.[81] Finally, the relatively small impact of SPIR on occupational choice compared to the effect of the IRR may be due to the fact that unemployed people have a strong inclination towards self-employment, no matter whether the earnings as a wage worker may be higher or not.

The effect of the IRR for transitions into self-employment, which is strongly negative and quite high compared to the transition to paid-employment, is also found by Carrasco (1999). Whereas she interprets this as strong evidence for the hypothesis of self-employment as a reaction to discrimination, I explain this effect with the uncertainty of self-employment income. For sure, expected self-employment earnings are more uncertain than actual unemployment benefits. Therefore, only self-employment earnings, which are much higher than unemployment earnings, are worth a transition.

For the probability of dropping out of the labour force the expected result is found that higher unemployment benefits prevent people from dropping out.

As pointed out in other studies (e.g. Pfeiffer, 1994), the former employment status of the father is an important determinant of self-employment. This is also true for unemployed people, whose probability of becoming self-employed rises if the father was self-employed, when the individual was aged fifteen. This observation can be a reference for the importance of social networks. Furthermore, it supports the above hypothesis of a strong inclination towards self-employment which can be well-founded within the family. The dummy variable, which indicates that the father's employment status is unknown, is insignificant. Self-employment of the father has no impact on the probability of becoming paid-employed or inactive.

[81] Doubling the expected income from self-employment is equal to doubling the SPIR and halving the IRR.

The results for the influence of the first job an unemployed person had on the occupational choice also supports the inclination-hypothesis. Self-employment compared to a blue-collar job as the first occupation improves the probability of becoming self-employed after a period of unemployment most. Also a white-collar job improves the possibility of entering self-employment. In contrast, an initial self-employment reduces the risk of becoming paid-employed, whereas inactivity is more often found among those which were first white-collar workers or for whom the initial employment status is missing.

Entering self-employment is most likely among those unemployed who entered the labour market at the age of 25. Younger and older labour market entrants face lower transition probabilities. For those becoming inactive almost the same influence of the age at the first job is found. Apart from that the maximum is at an age of 28. Transitions into paid-employment do not depend on the age at labour market entrance.

The regional heterogeneity is controlled by the time-invariant GSOEP Sample and the time-variant region of residence. The significant impact of the sample membership on occupational choice, shows that there is still heterogeneity between the different GSOEP samples present, even after controlling for nationality and region of residence. This heterogeneity can be a result of the sample construction, e.g. the overweighting of Sample B.[82] Foreigners in West Germany (Sample B) and Immigrants (Sample D) are most likely to stay unemployed. Transitions to self-employment are least likely for these groups of population. In contrast, people contained in the East German Sample (Sample C) are more likely to become paid-employed. The region of residence has no influence on the probability of becoming self-employed, whereas the unemployed living in the north and south are more likely to move into a paid job. Those dropping out of labour force reside more often in the southern and middle-western states.

The larger the city of residence is, the lesser is the probability of getting employed, no matter whether self or paid. In particular, the chance of becoming self-employed is small in areas of 100,000 to 500,000 citizens. Inactivity does not depend on the size of the city.

Concerning the macro-economic factors, I find evidence neither for the unemployment-push nor for the demand-pull hypothesis. The GDP growth rate is only significant above the 10% level. In contrast, the GDP growth rate favours transitions into paid-employment and prevent those into inactivity, while the UV-ratio reduces the possibilities of getting into paid work. Furthermore, the interest rate has no influence on all the transitions out of unemployment. Hence, the insignificance of the impact of the interest rate on transitions into self-employment could be a further reference to lowered capital constraints through the grant of bridging allowance, in the sense that the unemployed people subsidised with bridging allowance do not have to rely that much on credits.

Finally, unemployed people not worrying about their personal economic situation and being more satisfied with their lives or income are more likely to become

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[82] For the construction of the GSOEP samples see the GSOEP Desktop Companion (2000).

self-employed. The same holds true for the probability of becoming paid-employed or inactive, but to a lesser extent. If one believes that people with optimistic views about their situations are less averse to risk, then this effect coincides with the theory that people who are ready to take risks are more likely to become self-employed. Satisfaction with the income has only a positive impact on transitions to paid-employment and inactivity.

Summarising the findings on the determinants of self-employment, the following conclusions can be drawn. *Firstly,* the hypothesis of self-employment as a reaction to discrimination can be rejected. On the contrary, the self-employed coming from unemployment have a higher educational degree than the average unemployed and are aged between 30 and 45, which also indicates a relatively high endowment with human capital. *Secondly,* those entering self-employment have a strong inclination to this occupation. This inclination is shown due the influence of self-employment in the family and former self-employment experience on the own occupational choice. Furthermore, the alternative of paid-employment seems less important than the alternative of unemployment, which is shown by the strong impact of the IRR compared to the SPIR. Hence, the self-employed coming from unemployment have similar characteristics, in particular, age, occupational degree and social background as the self-employed coming from paid-employment (see also the discussion of Chapter 7. *Thirdly,* the positive duration dependence as well as the insignificance of the asset variables and the interest rate may indicate that the promotion with bridging allowance helps to overcome liquidity constraints. *Fourthly,* the determinants of self-employment differ from those of paid-employment, which confirms the hypothesis that both groups are selective and a naive comparison of employment duration may be biased (see the following section).

6.5.3 Stability of Self-Employment and the Effects of Bridging Allowance

The estimation results of the job stability are derived from two reduced form binomial logit models with non-parametrically distributed individual heterogeneity: One for the sample of the initially self-employed and another for the sample of the initially paid-employed. For the estimation of employment duration among the self-employed no individual heterogeneity is found at all (see Table 10). In contrast those who initially entered paid-employment can be divided into three different groups of heterogeneity. The first group has a strong attitude to stay employed. Those individuals account to the whole population with a probability of nearly a half. The second is the group, which faces the highest risk of becoming unemployed again. However, these individuals are only present to a minor extent, with a share 10% of the whole population. Finally the third, and the largest, heterogeneity group has unobserved characteristics that rise the risk of falling back into unemployment.

Since the coefficients of the reduced form estimations are difficult to interpret, and since the focus of this section is primarily based on the difference between survival rates and the effects of legal changes of bridging allowance on survival

rates in self-employment and paid-employment, only the most interesting parameters will be discussed. The results of the estimation are listed in Table 10.

With respect to job-stability Figure 8 shows that the initially self-employed, given their characteristics, face a lower risk to become unemployed again than they would have faced, if they had entered paid-employment, i.e. $\Delta_{SE} > 0$. After four years of employment, the initially self-employed have a survival probability in employment of more than 80% in contrast to the less than 50% they would have had if they had decided to enter paid-employment. This shows that self-employment could be the right way out of unemployment for those who in fact entered self-employment. It is important to note that this result refers only to treatment-on-the-treated and therefore does not allow conclusions to be drawn about the sample of the non-treated.
To answer the question whether bridging allowance should be extended in order to enable as many unemployed people as possible to enter self-employment, one has to assess the effect of treatment-on-the-non-treated, i.e. the difference in employment duration among the paid-employed (Δ_{PE}). Considering the survival rates in employment in the sample of the paid-employed (see Figure 9), the answer tends to be yes. Self-employment shows more stability with a survival probability of nearly 46% after eight years of employment, compared to a survival probability of 39% for paid-employment. However, the difference between the two states is only around 7 percentage points.[83]

Based on these findings self-employment seems to be a worthwhile opportunity for the exit of unemployment, not only for those who in fact entered self-employment, but also for those who chose a paid job, at least for the average of those. Furthermore, according to these findings and the previous section, the hypothesis of the self-employed as being discriminated can be rejected. The estimated survival probability in employment among the self-employed is over 30 percentage points higher than the estimated survival probability in employment among the paid-employed. In the case of the self-employed population, even the hypothetical probability of staying employed after entering paid-employment is as high as the observable probability among the paid-employed. Therefore, those who decide to enter self-employment have characteristics which favour a stable employment.

[83] The corresponding graphs for the Sample-West can be found in the Appendix, Figure 25 and Figure 26.

Table 10: Determinants of Employment Termination

	Paid-employed		Self-employed	
	Coeffi-cient	Standard Error	Coeffi-cient	Standard Error
Process time				
4-6 months	0.428	0.076		
7-9 months	0.888	0.080	2.003	0.650
10-12 months	1.137	0.091		
13-18 months	0.751	0.100	2.265	0.792
19-24 months	0.479	0.117	2.842	0.809
25-30 months	0.420	0.133	2.755	0.832
31-36 months	0.487	0.138		
37-48 months	0.116	0.139	2.823	0.889
49-60 months	0.123	0.161		
≥61 months	-0.118	0.143		
Period of entry into employment				
86-88.7	0.053	0.093	-1.770	0.871
88.8-94.7	0.306	0.087	-1.103	0.746
After 94.8	0.155	0.096	-0.674	0.832
Quarter of entry into employment status				
Second quarter	0.193	0.061		
Third quarter	0.044	0.070		
Fourth quarter	0.108	0.072		
Calendar quarter				
Second quarter	-0.283	0.074		
Third quarter	-0.155	0.067		
Fourth quarter	0.346	0.059		
14 ≤age < 25	0.427	0.098	0.911	0.790
25 ≤age < 30	0.204	0.090	-0.103	0.694
30 ≤age < 35	0.152	0.088	-0.203	0.655
40 ≤age < 45	0.172	0.097	-1.317	0.613
45 ≤age < 50	0.179	0.106		
50 ≤age < 55	0.262	0.110	-0.969	0.913
55 ≤age < 67	0.627	0.117		
No occupational degree			1.885	0.669
Technical college/master craftsman			1.040	0.619
University/higher technical college degree			1.701	0.751
Agriculture	0.195	0.235		
Mining/energy	-0.082	0.349		
Construction	0.287	0.110		
Trade	-0.109	0.130	-0.396	0.545
Transportation/communication	-0.084	0.173		
Banking/insurance	-0.335	0.353		
Services	0.235	0.123		
Non-business organisations	0.272	0.198		

Regional authorities/social security	0.215	0.136		
Others	-0.031	0.158	1.095	0.886
20-199 employees	-0.086	0.070		
200-1999 employees	-0.207	0.091		
≥2000 employees	-0.183	0.115		
Scientists	-0.674	0.278		
Engineer	-0.481	0.214		
Physician/medical assistant	-1.040	0.307		
Lawyer/accountant/educator	-0.085	0.243		
Pastoral worker/artist/journ./author/sportsman	-0.261	0.211		
Manager	-0.808	0.300		
Bookkeeper/cashier	-0.408	0.154		
Other office worker/manager	-0.642	0.160		
Wholesale/retail/sales	-0.570	0.290		
Sales staff	-0.454	0.171		
Restaurant trade	-0.304	0.205		
Domestic occupation	-0.597	0.255		
Plain services	-0.724	0.161		
Farmer/fisherman/forestry worker	0.237	0.225		
Mining/wood/chemical worker	-0.199	0.158		
Textiles/foodstuff worker	-0.610	0.224		
Metal worker	-0.649	0.144		
Electrician	-0.492	0.214		
Operator, others	-0.259	0.117		
Brief training on the job required	-0.151	0.105	-1.607	0.687
Longer training on the job required	-0.432	0.120		
Training off the job required	-0.383	0.156		
Occupational degree required	-0.581	0.108	-1.656	0.605
University or higher tech. college degr. required	-0.649	0.195		
No information on the current job	0.861	0.150	0.853	0.900
Foreigner			1.154	0.735
Disabled	0.263	0.103		
Female	0.110	0.093	1.512	0.591
Single	0.066	0.087		
Not married	0.169	0.127		
Children < 16 years	-0.026	0.072	-0.344	0.607
Female * single	-0.226	0.115		
Female * not married	-0.497	0.176		
Female * children < 16 years	0.228	0.103	-1.302	0.897
Spouse income	0.026	0.008		
Household income	-0.106	0.018	-0.319	0.121
Housing ownership			-1.171	0.583
IRR	0.377	0.083	1.368	1.073
First job self-employed	0.226	0.286		
First job white-collar	0.047	0.069		

First job missing	0.285	0.078		
Father self-employed			-1.313	0.977
Employment status of father missing			-0.432	0.535
Age at first job			21.586	10.097
Age at first job squared			-5.462	2.464
Northern federal states	0.118	0.092		
Middle-western federal states	0.102	0.101		
Southern federal states	0.274	0.085		
North-eastern federal states	0.013	0.099		
South-eastern federal states	-0.045	0.108		
20,000 $\leq$citizens < 100,000	-0.118	0.062	0.788	0.559
100,000 $\leq$citizens < 500,000	-0.041	0.075	-0.799	0.622
500,000 $\leq$citizens	-0.169	0.083	0.937	0.631
Regional UV-ratio	0.135	0.022	0.234	0.122
GDP growth rate	-0.029	0.010	0.157	0.070
Some worries about economic situation	-0.156	0.052		
No worries about economic situation	-0.255	0.083		
Satisfaction with life	-0.044	0.013		
Satisfaction with income	-0.037	0.012		
Constant	-3.515	0.267	-26.744	10.501
μ^1	-0.907	0.134		
μ^2	1.780	0.357		
μ^3	0,703	-		
q^1	0.452	0.145		
q^2	0.010	0.007		
q^3	0,558	-		
Log likelihood	-10,234.658		-189.167	
Number of observations	108,263		5,626	
Wald test	$\chi^2(92)$ =2364.89		$\chi^2(37)$ = 97.08	

Notes: (i) FIML estimation of the binomial logit model with non-parametrically distributed heterogeneity on the basis of Waves 1-16 of the GSOEP. (ii) Reference categories for dummy variables are: 1 to 3 months of process time for the paid-employment model and 1 to 6 months for the self-employment model, period of entry into employment status prior to 1986, first quarter of entry into employment status, first calendar quarter, 35 $\leq$age < 40, apprenticeship, manufacturing for the paid-employment model and manufacturing and construction for the self-employment model, less than 20 employees, electrician, no training required, no occupational degree required, married, no spouse, father not self-employed, first job blue-collar, GESOEP Sample A and E, North-Rhine Westphalia, citizens < 20,000, hard worries about economic situation. (iii) For the self-employment model the categories 7 to 9 months and 10 to 12 months of process time, 19 to 24 months and 25 to 36 months of process time, 37 to 48 months, 49 to 60 months and 61 months and more of process time; 40 $\leq$age < 45 and 45 $\leq$age < 50, 50 $\leq$age < 55 and 55 $\leq$age < 67; trade, transportation/communication; banking/insurance and service, agriculture, mining/energy, non-business organisations, regional authorities/social security and others; brief training on the job, longer training on the job and training off the job required, Occupational degree and university or higher technical college degree required are combined.

Figure 8: Survival in Employment Among the Initially Self-Employed

Notes: (i) Simulations for the sample means of the initially self-employed based on the estimates reported in Table 10.

Figure 9: Survival in Employment Among the Initially Paid-Employed

Notes: (i) Simulations for the sample means of the initially paid-employed based on the estimates reported in Table 10.

To address the question whether bridging allowance can improve the stability of self-employment, the coefficients of the period of entry into employment are analysed. The highest employment stability among those entering self-employment can be found during the introduction period of bridging allowance, i.e. between January 1986 and July 1988. (see Table 10). The highest risk of losing employment is found in the period prior to the introduction of bridging allowance. During the restrictive period between August 1988 and July 1994, as well as during the period of the most liberal grant from August 1994 onwards, the coefficients are negative, but the hazard of leaving employment is statistically not different from the one of the reference period. The relatively large coefficients and standard errors are a result of the small cell sizes. Therefore, these findings should be interpreted with care. Nevertheless, this can represent a hint that the existence of a programme like bridging allowance can improve the stability of (self-)employment, due to either higher capital endowment of the new businesses or reduced capital constraints, which can help more unemployed who are suited for self-employment to enter this state. Another possible effect could be a higher re-employment opportunity in paid-employment due to the escape of unemployment with the help of bridging allowance. It might be easier to find a job from self-employment than from unemployment, signalling economic activity.

To summarise, we find that self-employment compared to paid-employment is the better opportunity of leaving unemployment, at least for the average population, but for *both* samples of initial employment. Furthermore, the presence of bridging allowance seems to improve the stability of self-employment. But which factors drive these average results? A closer look at the estimated coefficients, might reveal more details of the process of employment duration. Moreover, simulations with specific sub-populations may give some deeper insights. Hence, these simulations are carried out for the sample of the initially paid-employed. Reliable simulations for the self-employed are not possible, because of the small sample sizes.

Starting with the impact of process time on employment duration it can be seen for the paid-employment model that during the first year of employment the risk of losing the job steadily increases (Table 10). Afterwards, this risk declines until 36 months of process time, but still being higher compared to the first three months. From the fourth year of employment on, the hazard rate is not significantly different from the reference category. For those being self-employed the hazard rate seems to be increasing over self-employment duration. In particular, after the first six months the probability of becoming non-employed sharply increases. This result is in contrast to Bryson and White (1996) who find that the probability of leaving self-employment decreases with process time.[84] A possible explanation may be the legal arrangement of bridging allowance. During the first six months of self-employment there is a very low intention of leaving self-employment as some part of the subsidisation may be lost. Therefore, the relatively high probability of exiting self-employment with longer employment duration, in

[84] The studies by Taylor (1998, 1999 and 2001) on the duration of self-employment do not test for duration dependence, as he employs the Cox proportional hazard model.

fact may be a very low probability of leaving during the first six months. Nevertheless, with longer employment duration, paid-employment seems to be more stable than self-employment, which can also be seen from the narrowing graphs of Figure 9.

As shown above, the presence of bridging allowance, leads to a lower hazard of employment termination, at least for the initially self-employed. In contrast, employment stability among the initially paid-employed is the highest before 1986 and between 1986 and July 1988. Therefore, the adjustment of the legal arrangements of bridging allowance mainly had a positive impact in the sample of the initially self-employed. The graphs in Figure 10 confirm this point of view. As shown above, the hypothetical survival probability in self-employment among the paid-employed would be higher between August 1988 and July 1993 as well as after July 1994 than prior to 1986. Since August 1988 this probability would have been even higher than the corresponding survival probability in paid-employment. In contrast, before the introduction of bridging allowance the situation is reversed. Those initially entering paid-employment are in fact better off in a dependent job, than they would have been in self-employment. Thus, bridging allowance improves the stability of self-employment in general.

Figure 10: Survival in Employment Among the Initially Paid-Employed for Different Entry Periods

Notes: Simulations for the sample means of the initially paid-employed based on the estimates reported in Table 10.

This result provokes the question: Why did not more people enter self-employment? From Figure 10, we have seen that not only the average paid-employed would have found a more stable employment opportunity choosing self-employment, but that this higher stability is mainly present after the introduction

of bridging allowance. For sure, as explained in Section 2.3.1, the grant of bridging allowance was restricted between August 1988 and July 1994. Therefore, not all unemployed willing to enter and being suited for self-employment, were able to get a subsidisation. This is true for the restrictive, but not for the liberal period after July 1994. So the question still remaining is: Why did those unemployed not enter self-employment, although bridging allowance was granted with hardly any restrictions? To answer this question, we should have a closer look at different sub-groups of the population.

The coefficients of age show different impacts for the paid- and self-employed, respectively. Whereas among the initially paid-employed, younger and older age groups, especially the youngest and the oldest, face a high risk of exiting employment, the difference between the age groups for the self-employed is much lower. On the contrary, those aged between 35 and 39 have a relatively high hazard of becoming non-employed compared to those being older. Hence, several age groups among the formerly unemployed are better off in paid-employment than they would have been in self-employment. E.g., those being aged between 14 and 24 years face a higher probability of staying employed when entering paid-employment compared to self-employment, especially in the long run (see Figure 11). Also those between 25 and 29 years old are better off in paid-employment after 42 months of process time. This coincides with the above finding that paid-employment compared to self-employment is more stable in the long run.

Figure 11: Survival in Employment Among the Initially Paid-Employed for Different Age Groups

Notes: Simulations for the sample means of the initially paid-employed based on the estimates reported in Table 10.

A further interesting result is given by the influence of the occupational degree on employment duration. Surprisingly, this influence is not statistically different from zero in the sample of the paid-employed. The employment duration of self-employed people, however, varies with the occupational degree. The lowest risk of becoming non-employed is found for those with an apprenticeship, whereas those with no occupational degree and those with a university degree, respectively, face the highest risk of exiting employment. These different coefficient estimates also result in different overall survival rates in employment for the different sub-groups of occupational degree. As the graphs in Figure 12 show those without an occupational degree have a higher survival probability in paid- employment compared to self-employment. In contrast, those with a higher technical college degree face the same stability of employment no matter which occupation they chose, at least in the long run, and those with a university degree would find a more stable employment if they had entered self-employment after unemployment. Therefore, self-employment would have been a worthwhile opportunity for the high-skilled among the self-employed, whereas the unskilled are better advised to search for a dependent work.

Figure 12: Survival in Employment Among the Initially Paid-Employed for Different Occupational Degrees

Notes: Simulations for the sample means of the initially paid-employed based on the estimates reported in Table 10.

Job related characteristics are mostly insignificant for the self-employed. The most interesting effect is that a self-employed job, which requires some kind of training or occupational degree is more stable than a job without such a requirement. For the paid-employed similarly results are found. But the impact of the required training or degree is much lower than in the sample of the self-employed.

Hence, paid-employment is in fact the better opportunity in jobs without a requirement on training, whereas self-employment would have been the better opportunity for jobs with a university or higher technical college degree required (see Figure 13).

Some further results show that disabled people are more likely to quit paid-employment, whereas foreigners face a higher hazard of exiting self-employment. Although, this effect is only weakly significant. Females tend to quit self-employment with a higher probability than men, but females with dependent children have a tendency to stay self-employed. In contrast, married women having children younger than 16 are more likely to leave paid-employment.

Figure 13: Survival in Employment Among the Initially Paid-Employed for Different Training Required for Occupation

Notes: Simulations for the sample means of the initially paid-employed based on the estimates reported in Table 10.

Turning to the asset variables it can be seen from Table 10 that a higher income of the spouse only raises the hazard of non-employment among the initially paid-employed. On the other hand housing ownership reduces the risk of non-employment only for the initially self-employed. Finally, a higher household income increases job stability for both employment groups. However, this impact is larger for the self-employed. Therefore, after a process time of more than 43 months, people with a household income of less than 1,900 DM have a higher survival probability in paid-employment than they would have had in self-employment (see Figure 14). In contrast those unemployed at the upper tail of the household income distribution (over 6,000 DM) would have been better off in

self-employment compared to paid-employment in terms of job stability, and independently of process time.[85]

Figure 14: Survival in Employment Among the Initially Paid-Employed for Different Amounts of Household Income

Probability

- Survival of the Initially Paid-Employed with a Household Income of < 1,900 DM
- Survival of the Initially Paid-Employed with a Household Income > 6,000 DM
- Survival of the Initially Self-Employed with a Household Income of < 1,900 DM
- Survival of the Initially Self-Employed with a Household Income of > 6,000 DM

Process Time in Months

Notes: Simulations for the sample means of the initially paid-employed based on the estimates reported in Table 10.

Finally, characteristics of the social background are mostly insignificant. But at least for the self-employed, an interesting result is the negative, but only weakly significant, influence of self-employment of the father on the risk of exiting employment. Furthermore, the self-employed face the highest risk of becoming non-employed, if they entered working life at an age of 19. Hence, the later the entrance into the first job is, the less likely do self-employed quit their job. This coincides with the findings for the influence of age and occupational degree on the non-employment hazard.

Nevertheless, the question still to be answered is: Why did those unemployed not choose a self-employed occupation, although this would have yielded a lower risk of becoming non-employed? A possible answer is that the individuals might not be aware of the chances self-employment can offer due to a lack of information. Also those people probably do not have the confidence to enter self-employment because of missing self-employment experience. Additionally, risk aversion might be high among those becoming paid-employed, i.e. a paid-employment opportunity is viewed as being more secure. Furthermore, the existence of several regulations for the start-up of a business can prevent the unemployed from entering self-employment. E.g. in the craft sector as well as in some professional occupations special examinations or vocational degrees are a neces-

[85] 1,900 DM represents the 10%- and 6,000 DM the 90%-Percentile.

sary precondition for becoming self-employed. And last but not least the existence of capital constraints may prevent an unemployed suited for self-employment from starting a business. Although bridging allowance may have reduced capital constraints since its introduction in 1986, this programme seems to be an insufficient subsidisation for start-ups envisaged by the high-skilled. This result is also found by Reize (2002) for self-employment in Europe.

Therefore, the main conclusions which can be drawn from this analysis are that, firstly, the unemployed entering self-employment are rather "the good" among the unemployed than the discriminated and secondly that bridging allowance has a slightly positive effect on job stability. The simulations on the sample of the paid-employed showed that self-employment would have been the better route out of unemployment not only for the average population, but especially for the highly qualified, older unemployed with a relatively high household income. Therefore, even the unrestricted grant of bridging allowance cannot activate a large portion of potential founders, in particular among the high-skilled. Only for some specific groups of the paid-employed individuals the occupational choice is based on self-selection. Hence, paid-employment seems to be the right choice for the younger and low-skilled individuals. Furthermore, with longer employment duration the stability of paid-employment comes closer to the one of self-employment.

The finding that bridging allowance is not suited to lower capital constraints among the high-skilled entering paid-employment, raises the question whether those high-skilled entering self-employment would have entered that state without subsidisation, too. The answer tends to be yes. This is confirmed by the fact that the self-employed are a positive selection out of the pool of the unemployed and that occupational choice for them is based on self-selection. All these results hint on the possibility that bridging allowance can cause high dead-weight effects; in particular, if the subsidisation is generous. In the view of the self-selection among the initially self-employed it seems to be very likely that those unemployed may have entered self-employment even without any subsidisation or only became unemployed to get in favour of the subsidisation. Hence, the presence of bridging allowance may reduce the risk of unemployment for the initially self-employed on the one hand, but on the other hand it may also cause additional temporary unemployment.

6.5.4 The Development and Distribution of Income

The results of the income estimation confirm the findings of the previous section.[86] As shown in Table 11 the difference in expected income (DEI) in the sample of the initially self-employed is on average 589.61 DM. Hence, those entering self-employment, in fact, earn a higher income compared to the hypothetical situation if they had become paid-employed. Table 11 also shows that not all self-employed individuals have a positive DEI. However, the median is still positive but lower than the mean.

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[86] Estimation results are displayed in Table 13.

Table 11: Distribution of the DEI

	Self-employed	Paid-employed	Paid-employed (max)
5%-Percentile	-2,089.09	-298,643.30	-28,419.73
25%-Percentile	-698.81	-2,4667.24	-8,265.28
50%-Percentile	97.10	-3,156.35	-754.66
75%-Percentile	1,358.10	1,446.37	1,907.42
95%-Percentile	4,306.27	3,757.35	3,994.23
Mean	589.61	-83,232.41	-4,860.95
Standard Deviation	2,367.23	529,958.70	10,120.95

Note: (i) Figures are based on the estimated DEI obtained by the fixed effects estimations reported in Table 13 and in Table 47 in the Appendix. (ii) Values are in DM.

Figure 15: Kernel Density Estimation of the DEI for the Sample of the Initially Self-Employed

Note: (i) Kernel Density Estimation is based on the estimated DEI obtained by the fixed effects estimations reported in Table 13. (ii) Values for DEI are in DM.

A kernel density estimation, illustrated in Figure 15, yields an indifferent result. The mass of the kernel density of the DEI is left of the maximum of the normal distribution with mean 589.61 DM. Moreover, a well portion of the DEI density is found for negative DEI. Finally, Figure 15 clearly shows the skewed distribution of the DEI, with some very high values (over 40,000 DM), responsible for the high mean. Albeit, there is a positive DEI on average, over the total distribution the differences diminish.

Figure 16: Kernel Density Estimation of the DEI for the Sample of the Initially Paid-Employed

Note: (i) Kernel Density Estimation is based on the estimated DEI obtained by the fixed effects estimations reported in Table 13. (ii) Values for DEI are in DM.

As in the previous section, the results for the initially paid-employed yield the picture of economically irrationally acting people. From Table 11 it can be seen that the mean DEI is over -83,000 DM, i.e. the average paid-employed would have earned over 83,000 DM more if he had entered self-employment. However, this result arises from a heavily skewed distribution of the DEI in the sample of the paid-employed. Therefore the median DEI is only around -3,156 DM. The very low values of the DEI at the lower and of the distribution are driven by implausibly large values for the hypothetical expected income from self-employment, with a maximum of 17 billion DM (!).[87] As a consequence, the kernel density estimation for the sample of the paid-employed results in a completely flat estimation of the normal distribution and a left-skewed estimation of the DEI distribution (Figure 16). Moreover, the density is at its maximum only 0.00001, which is around 40 times less than in the sample of the self-employed.

In order to get comparable results, the sample of the paid-employed was reduced. Within several simulations I employed a sample which was restricted to the 99%-, 95%-, 90%-percentile of the hypothetical income from self-employment as well as a sample which was restricted to the maximum value of the estimated income from self-employment in the sample of the initially self-employed (max-Sample), which is 44,516.88 DM. The last column of Table 11 shows the distri-

[87] Based on several simulations, it was not possible to isolate a specific individual or a specific type of individuals which cause these implausible values.

bution of DEI for this sample. The mean as well as the median are still negative, and the mean is smaller than the median. However, the kernel density estimation shows the modus for the DEI at 1,799.21 DM (see Figure 17). Hence, although the median as well as the mean are negative, the value with the highest probability is positive.[88]

Figure 17: Kernel Density Estimation of the DEI for the Sample-Max of the Initially Paid-Employed

Note: (i) Kernel Density Estimation is based on the estimated DEI obtained by the fixed effects estimations reported in Table 13. (ii) Values for DEI are in DM.

Table 12 reports the impact of different legal arrangements of bridging allowance on the expected income from self-employment. Unfortunately, based on the fixed effects estimation, the time-invariant variable of period of entry into employment status can not be included into the coefficient vector. Nevertheless, the legal arrangement enters the regression on the fixed effect, which is also part of the calculation of the expected income (see Section 6.3.2). As it can be seen from Table 12, the highest expected income in the sample of the initially self-employed was obtained during the introduction phase of bridging allowance between January and July 1988. For this period the average expected income is nearly 5,000 DM and the median around 4,500 DM. The lowest mean and also median is found during the most liberal period since August 1994. The average expected income

[88] Kernel density estimations for the other samples can be found in the Appendix, Figure 27 to Figure 29.

during this period is over 2,000 DM lower than during the introduction phase.[89] Hence, there is no clue to an improvement of the income situation of the self-employed due to bridging allowance. This dramatically reduction of expected income from self-employment may reflect the decreasing average firm size during the 1990s (see BMBF, 1999) or the missing of control variables for time effects. Thus, the reduction of income should not be regarded as a causal effect of bridging allowance.

Table 12: Distribution of the Expected Income Among the Initially Self-Employed for Different Entry Periods

	Prior to 1986	Between 1986 and July 1988	Between August 1988 and July 1994	Since August 1994
Median	4,145.67	4,483.64	2,599.95	2,465.74
Mean	4,968.97	5,071.53	3,040.71	2,987.27
Standard Deviation	2,449.73	3,001.77	2,002.80	3,161.45

Note: (i) Figures are based on the estimated expected income from self-employment obtained by the fixed effects estimations in Table 13 and in Table 47 in the Appendix. (ii) Values are in DM.

Figure 18: Estimated Income over Process Time

Notes: (i) Graphs are based on the estimated expected income obtained by the fixed effects estimations reported in Table 13. (ii) Changes of expected income are relative to the first month of process time.

[89] Results for the sample of the initially paid-employed are omitted because of the implausible estimation results for the hypothetical income from self-employment.

Table 13: Fixed-Effects Income Estimation for the Self- and Paid-Employed for the Sample-All

	Paid-employed		Self-employed	
	Coeffi-cient	Standard Error	Coeffi-cient	Standard Error
Process time	0.008	2.23E-04	0.015	0.002
Process time squared	-0.00007	0.000004	-0.000128	0.000030
Process time to the power of 3	2.38E-07	1.65E-08	3.29E-07	1.35E-07
Calendar quarter				
Second quarter	-0.006	0.003	-0.016	0.025
Third quarter	-0.016	0.003	-0.056	0.024
Fourth quarter	-0.047	0.003	-0.113	0.023
14 ≤age < 25	-0.039	0.011	-0.227	0.113
25 ≤age < 30	-0.015	0.008	0.123	0.079
30 ≤age < 35	-0.008	0.006	-0.015	0.051
40 ≤age < 45	-0.029	0.007	-0.048	0.054
45 ≤age < 50	-0.079	0.010	-0.077	0.087
50 ≤age < 55	-0.183	0.013	-0.232	0.119
55 ≤age < 67	-0.288	0.016	-0.083	0.153
No occupational degree	-0.562	0.024		
Technical college	-0.090	0.034		
Master craftsman	0.254	0.023		
Higher technical college	0.113	0.085		
University degree	-0.149	0.075		
Agriculture	-0.296	0.026		
Mining/energy	-0.033	0.025		
Construction	-0.022	0.010		
Trade	-0.029	0.010	-0.185	0.197
Transportation/communication	0.021	0.013	0.891	0.730
Banking/insurance	0.066	0.029	-0.503	0.365
Services	0.064	0.011	0.653	0.285
Non-business organisations	-0.021	0.018		
Regional authorities/social security	-0.021	0.013		
Others	0.024	0.012	3.055	0.282
20-199 employees	0.029	0.006		
200-1999 employees	0.055	0.008		
≥2000 employees	0.096	0.010		
Scientists	0.037	0.022	3.742	0.589
Engineer	0.019	0.019		
Physician/medical assistant	0.352	0.030		
Lawyer/accountant/educator	-0.181	0.031	5.012	0.568
Pastoral worker/artist/journ./author/sportsman	0.125	0.021		
Manager	0.035	0.020	5.546	0.658
Bookkeeper/cashier	-0.029	0.015		
Other office worker/manager	0.050	0.015	2.596	0.601

Wholesale/retail/sales	0.172	0.023	3.290	0.497
Sales staff	0.008	0.016	4.164	0.593
Restaurant trade	-0.157	0.024	(dropped)	
Domestic occupation	-0.009	0.025	5.836	0.668
Plain services	0.023	0.016		
Farmer/fisherman/forestry worker	0.022	0.024		
Mining/wood/chemical worker	-0.085	0.016	5.772	0.643
Textiles/foodstuff worker	-0.088	0.023		
Metal worker	-0.043	0.013		
Electrician	0.024	0.023		
Operator	0.007	0.012		
Others	0.203	0.046		
Brief training on the job required	0.035	0.010	0.066	0.341
Longer training on the job required	0.099	0.012	-0.822	0.243
Training off the job required	0.016	0.014	0.922	0.221
Occupational degree required	0.085	0.011	0.716	0.253
University or hi. tech. coll. degree required	0.229	0.020	-1.226	0.362
Not working in trained occupation	-0.037	0.008	0.433	0.139
In training on the job	-0.553	0.034	-0.040	0.306
No occupational degree	-0.081	0.014		
No information on the current job	-0.150	0.017	5.752	0.654
Foreigner	-0.021	0.024		
Disabled	-0.049	0.010	0.009	0.192
Single	0.003	0.009	0.134	0.092
Not married	0.044	0.014	-0.880	0.164
Children < 16 years	0.013	0.006	0.133	0.053
Female * no occupational degree	0.328	0.035		
Female * technical college	0.142	0.046		
Female * master craftsman	-0.441	0.063		
Female * gigher technical college	-0.232	0.121		
Female * university degree	-0.091	0.216		
Female * single	0.015	0.015	-0.418	0.204
Female * not married	-0.004	0.019	0.803	0.219
Female * children < 16 years	-0.049	0.010	-0.033	0.090
Spouse full-time employed	0.028	0.007	0.105	0.093
Spouse part-time employed	0.039	0.009	0.052	0.105
Spouse out-of-labour-force	0.036	0.010	0.084	0.103
Spouse income	0.002	0.001	0.004	0.011
Spouse inactive	0.024	0.008	-0.202	0.097
Household interest	0.002	0.001	0.106	0.008
Housing ownership	0.001	0.006	-0.001	0.049
Northern federal states	0.192	0.036		
Middle-western federal states	0.023	0.034		
Southern federal states	0.075	0.031		
North-eastern federal states	-0.152	0.035		

South-eastern federal states	-0.206	0.040		
20,000 ≤citizens < 100,000	0.011	0.009	0.381	0.084
100,000 ≤citizens < 500,000	0.021	0.012	0.170	0.092
500,000 ≤citizens	0.059	0.014	0.072	0.135
Regional UV-ratio	-0.005	0.001	-0.013	0.010
Interest rate	0.002	0.001	-0.049	0.009
GDP growth rate	0.000	0.001	0.019	0.005
Some worries about economic situation	0.011	0.003	-0.037	0.029
No worries about economic situation	0.022	0.005	-0.159	0.044
Satisfaction with life	0.006	0.001	0.024	0.008
Constant	0.709	0.033	-4.065	0.556
σ_u	0.693		2.352	
σ_ϵ	0.338		0.557	
ρ	0.808		0.947	
Number of observations	104,113		4,910	
R^2-within	0.117		0.237	
R^2-between	0.135		0.002	
R^2-overall	0.160		0.001	
F-test that all fixed effects are 0	F(2,870, 101,148) = 43.49		F(141, 4,711) = 59.38	

Notes: (i) Fixed effects estimation on the basis of Waves 1-16 of the GSOEP. (ii) Reference categories for dummy variables are: first calendar quarter, 35 ≤age < 40, apprenticeship, manufacturing for the paid-employment model and manufacturing and construction for the self-employment model, less then 20 employees, painter/bricklayer/carpenter, no training required, no occupational degree required, married, no spouse, North-Rhine Westphalia, citizens < 20,000, hard worries about economic situation. (iii) For the self-employment model the categories agriculture, mining/energy, non-business organisations, regional authorities/social security and others; in training on the job and no occupational degree; scientists, engineer, physician/medical assistant, pastoral worker/artist/journalist/author/sportsman and lawyer/accountant/educator, bookkeeper/cashier and domestic occupation, plain services, farmer/fisherman/forestry worker, operator, others and mining/wood/chemical worker, textiles/foodstuff worker, metal worker, electrician are combined. (iv) For the self-employment model the age category is 55 ≤age < 69. (v) Missing groups of variables for the self-employment model are due to time-invariance.

Finally, the discussion of the other estimated coefficients is restricted to process time. The complete vectors of coefficients are displayed in Table 13.[90] Process time is modelled best using a parametrical, cubic distribution. As the graphs of Figure 18 show, the income from paid-employment is steadily increasing over employment duration. In contrast, the income from self-employment reaches its maximum after 89 months of employment duration. Furthermore, Figure 18 clearly indicates that the estimated income from self-employment is higher than the income from paid-employment. This confirms the findings of the previous

[90] The results for the regression of the time-invariant variables on the fixed effects can be found in the Appendix in Table 47.

section that those entering self-employment are a positive selection out of the pool of the unemployed.

The analysis of the income confirms the results of job stability. On the one hand the occupational choice among the initially self-employed is based on self-selection and on the other hand those entering paid-employment would have earned more if they had entered self-employment, at least on average. In contrast, to the previous section bridging allowance has no positive impact on the difference of estimated earnings. Only during the introduction phase between 1986 and July 1988 the self-employed would have earned more in self-employment compared to paid-employment, than prior to 1986. However, the primary aim of bridging allowance is not to improve self-employment incomes compared to paid-employment incomes. Its focus is on the stable reemployment of the unemployed and on the additional employment through the newly founded business. Moreover, the self-employed should earn at least two thirds of the wage for a similar paid job.

6.6 Summary and Conclusions

The main results of the estimation of determinants and success of self-employment among the former unemployed can be summarised as follows: The determinants of self-employment show great similarities to the determinants known from transitions from paid-employment to self-employment. Hence, there is a strong inclination towards self-employment among those unemployed who decide to become self-employed. The hypothesis that self-employment is a reaction to discrimination can be rejected. The self-employed coming from unemployment have a higher education than the average unemployed. Furthermore, the estimation of job stability confirms that the unemployed entering self-employment are in fact not the low skilled but rather "the good" unemployed. The survival rates in self-employment are higher than the ones in paid-employment.

Moreover, and this is particularly important in the context of the evaluation of self-employment as a permanent way out of unemployment, employment among those entering self-employment initially after unemployment proves to be more stable than employment would have proved, if those unemployed had entered paid-employment. Furthermore, income from self-employment is higher than income from paid-employment would have been. This convincing result for self-employment as an ideal way of permanent exit from unemployment is confirmed by the estimation results for the sample of the paid-employed. As a consequence, unemployed people entering paid-employment face a higher risk of re-entering unemployment than if they had entered self-employment initially after unemployment. In particular, the high-skilled among the paid-employed would have been better off in self-employment, whereas the young and unskilled unemployed in fact have better perspectives in a paid job as compared to running their own business. Thus, there are still constraints that prevent unemployed suited for self-employment to enter this state. Bridging allowance may have helped to overcome

liquidity constraints, but particularly among the high-skilled a lack of capital seems to be present.

Hence, which conclusions can be drawn from the effects of bridging allowance on employment stability? Firstly, the extension of the grant of bridging allowance seems to have a positive effect on lowering the risk of becoming unemployed again among the self-employed. Secondly, simulations for those entering paid-employment showed that during periods in which bridging allowance is available, self-employment would have been the better occupational choice for them. Therefore, as political advice for the usage of bridging allowance, one can conclude that it is important to offer bridging allowance, as it could lower capital constraints and therefore open the door to self-employment for a greater number of unemployed people who are suited for this kind of occupation. Moreover, this offer should not be restricted by limitations in the funds of bridging allowance. In this sense, the present legal form of bridging allowance (after the last change on August 1, 1994) seems to be the right way, as the funds are sufficient for all unemployed, who wish to enter self-employment.

However, these positive results for bridging allowance as an efficient active labour market programme are mitigated in two ways. First, bridging allowance may lower capital constraints, but there is still a large population among those entering paid-employment who are suited for self-employment but do not enter this state, even in the presence of bridging allowance. Moreover, those are the high-skilled. Hence, bridging allowance is not able to activate a large portion of high-skilled potential entrepreneurs. This result also questions whether bridging allowance has activated the high-skilled unemployed among those initially entering self-employment, or whether those individuals would have entered self-employment without subsidisation, too. If the latter is the case bridging allowance causes serious dead-weight effects. Second, in particular a liberal use of bridging allowance or even an extension of bridging allowance could also cause or increase those dead-weight effects. Bridging allowance in the actual form may help more unemployed people to become self-employed, but on the other hand it could cause more people to become (temporarily) unemployed in order gain access to the subsidy. The fact that self-employed people out of unemployment are a positive selection out of the pool of the unemployed population and that occupational choice among them is based on self-selection supports the possibility of dead-weight effects. Therefore, the shortcoming of this programme is rather the circumstance that the grant of bridging allowance is non-refundable than the fact that the funds are hardly limited. As a consequence the grant of bridging allowance may be revised to a partly refundable loan, with a low or zero interest rate, like e.g. the German subsidisation system for education and apprenticeship (BAFÖG). Furthermore, bridging allowance should be viewed mainly as a programme to reduce unemployment rather than as a firm start-up programme. For the latter other institutions than the Federal Employment Services seem competent, and on the other hand as the analysis showed, bridging allowance on its own is not suitable to activate a large portion of potential founders, particularly among the high-skilled.

Part III

Firm Start-Ups by the Unemployed

7 Microeconomic Issues on Firm Start-Ups

The following discussion on firm start-ups from unemployment and employment, respectively, is focused on the occupational choice of self-employment, i.e. to start a business, whereas in Chapter 5 the focus was on the decision of the unemployed to enter self- or paid-employment.[91] Thus, an individual's decision to form a company depends on the attractiveness of available alternatives, given prevailing governmental conditions.[92] Attractiveness will depend on initial financial endowment, human capital, risk aversion, the wish for independence, social and family networks and other factors determining preferences as well as costs and benefits which are also closely related to the size of the company which self-employed persons establish in Germany (see Pfeiffer, 1994).

An unemployed person will decide in favour of self-employment if the present value of the stream of expected utilities is higher compared to remaining unemployed or becoming a dependent employee, taking into account the possibilities of firm closure or the probability of finding a job. A worker will decide in favour of self-employment if the present value of the expected utilities from self-employment is higher compared to the expected utility he would have if he remained in his status, taking into account the probability of losing the job or finding a better one. Given similar preferences, the present values of the future stream of expected costs and benefits in the case of firm foundation presumably differ between the employed and unemployed. Substantial inputs have to be provided prior to firm foundation which might possess, in part, the characteristics of sunk costs. These include investments in product and production ideas, in human capital, in the establishments of networks with suppliers and customers, and in capital which depend on both the legal form of the start-up and on the particular trade or industry.

The capital endowment has to be covered by savings of the founder, by funds from banks or by other sources, among them bridging allowance. For an employee, supplier and customer networks might be more easily established compared to how it would be for the unemployed and, in fact, in many cases the special circumstances on offer at the job might help to create the idea of becoming a successful entrepreneur. The unemployed on the other hand are out of employment. For them it might be more difficult to establish networks or create success-

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[91] Consequently, the discussion of different theories includes the individual as well as the firm specific view.

[92] According to the German economic and trade regulations, in principle everybody is allowed to start a business. However, there are some exceptions (see Footnote 80).

ful ideas for business foundation, depending on the duration of unemployment. On the other hand, the unemployed might have more time for collecting information and creating their business plans than a full-time employee would have.

The present value of the expected stream of income should generally be higher for founders who were employed than for those who were unemployed before foundation, due to the higher opportunity costs as wage workers. The unemployed founders additionally experience opportunity costs as well. If there were no bridging allowance, the transfers from the unemployment insurance system would stop. With bridging allowance (see Section 2.3.1 for more details) the transfers continue for the first six months after firm foundation regardless of the success of the firm. Further opportunity costs might result if the founder reduces his or her search for permanent employment and thus may miss offers which are potentially more rewarding. Such costs are however not specific to the unemployed. For a founder who comes from wage work, it might not be easy to return to his or her former job or a comparable job if a period of self-employment signals preferences for independence (see Pfeiffer, 1994).

Microeconomic search theory provides a guideline for analysing search behaviour of the unemployed (see Chapter 5). The extension of search theory to include the choice of self-employment as an alternative to wage is certainly not less complex, due to the diversity of the additional alternatives. Instead of job offers, the unemployed person has to deal with market niches, product prices and production possibilities. One can assume that the information requirements of such a step lie above those of an employee.

Theoretical work carried out by Lucas (1978) and Kihlstrom and Laffont (1979) models the role of management capabilities, risk preferences and the initial capital endowment for the choice between self-employment and wage work in a general equilibrium framework with flexible wages and market clearing. Empirical work by Evans and Jovanovic (1989) for example, points to the role of liquidity constraints in the USA. Pfeiffer and Pohlmeier (1992) estimate the determinants of self-employment in a structural model of discrete choice under uncertainty with West German individual panel data.

However, the status of unemployment, a form of imbalance, is not considered by these studies. Human capital, risk preferences and initial capital endowment are also likely to give valuable hints for modelling the microeconomic decision situation of an unemployed person. For authors following the tradition of J. A. Schumpeter, the ability to overcome a disequilibrium points to the presence of entrepreneurial skills (see Schultz, 1981). A situation of an economic disequilibrium, such as high unemployment, leads people to become entrepreneurs. This triggers a process which can bring about new economic equilibrium. The study by Lechner and Pfeiffer (1993) points to the positive role of expected job losses for firm foundation plans of East German employees after the transition to a market economy in 1990.

The study by Pfeiffer (1999), based on job-seekers from the German labour force surveys 1991, 1993 and 1995, indicates that employment status influenced the search for self-employment in East and West Germany. The unemployed had a lower probability of seeking self-employment than did dependent employees in

1991. In 1995 there was no longer a difference between unemployed and employed job seekers.

Schulz (1995) models the decision for self-employment status using life cycle models and stresses the role of capital market imperfections and qualification requirements for the particular point in the individual's life cycle at which the transition to self-employment takes place. Although the state of unemployment is not explicitly modelled, the considerations might well be relevant to the situation of an unemployed person. However, these models, which are based on control theory, should also become significantly more complex when the unemployed person can choose between both alternatives: wage and salary employment and self-employment status.

An empirical testable approach often employed by studies investigating start-ups and the success of start-ups (see e.g. Nerlinger, 1998 or Wießner, 2001) divides the factors affecting firm success into three different groups: personal factors, firm specific factors and organisational factors.[93] Personal factors are mainly derived from the human capital theory and consist of e.g. age, schooling and occupational as well as sector specific experience. In contrast the transaction cost theory provides results for firm specific factors. Transaction costs mainly depend on the sector where the firm is located as well as on the legal form and hence on governmental regulations. Moreover, the initial capital endowment affects the possibilities where and how a business can be started. Finally, organisational factors are modelled within the approaches of the "liability of newness", the "liability of adolescence" and the "liability of smallness". The former two discuss the risk of firm death depending on firm age. Mostly, an inverted u-shaped hazard rate of firm death is assumed. The "liability of smallness" discusses the influence of firm size on the success of the firm. Beside age and size, also the importance of social and firm networks are discussed within the organisational approach.

As already discussed in Chapter 5 costs and benefits of company formations and alternative forms of earning a living are determined by aggregate economic factors as well. In accordance with the push-hypothesis poor perspectives in the labour market may force the unemployed to enter self-employment. However, also economic growth might be a pull-factor for the establishment of businesses (see Chapter 5 for more details).

The discussion of expected costs and benefits of occupational choice gives reason to assume that the threshold of the income stream at which a decision in favour of self-employment is made, is lower for unemployed people than for the employed. The opportunity costs in the form of foregone income of an unemployed founder *ceteris paribus*, i.e. given socio-demographic characteristics and capital endowment, probably lie below those of an employed person. The differences might be reinforced in times of high unemployment and poor job opportunities, might depend on individual unemployment duration and can probably be influenced significantly by active labour market programmes such as the bridging allowance.

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[93] See Brüderl et al. (1996, 33-66) and the references there for a detailed discussion on these approaches.

If one agrees that a higher income stream from business creation requires higher initial investments, then one should expect that, as a rule, business start-ups by unemployed people are smaller and require less capital. Brüderl et al. (1996), for example, obtained an average capital endowment of 93,000 DM for companies formed by previously employed people and an average of 34,000 DM for companies formed by previously unemployed people.

In addition they may tend to occur with a higher probability in industries with lower market entry costs, because in such industries initial investments can be lower. Whether this is indeed the case will furthermore depend on risk preferences and consumer behaviour. If consumer behaviour does not depend on the former labour market status of the founder, then differences might be small. Whether risk preferences differ between unemployed and employed persons and whether the fact that a firm has been founded by an unemployed instead of an employed person have ceteris paribus any impact on success, thus remains an empirical question.

8 Assessing the Impact of Bridging Allowance at the Firm Level

8.1 Econometric Modelling

8.1.1 Firm Start-Ups and Selectivity

To assess the quantitative impact of bridging allowance on firm success, a simple regression approach may be used, including an indicator whether the firm was founded by an unemployed or not. But as studies investigating the direct impact of social programmes have shown, participants and non-participants in the programme systematically differ in their observable *and* unobservable characteristics.[94] As discussed in Section 2.3 this seems also to be true for the subsidisation of firm foundation by the unemployed.[95] Such a selection bias may occur either through programme selection, e.g., when a competent authority has to assess the sustainability of the self-employment envisaged, or through self-selection. Besides observable characteristics such as the legal form of the firm or industry which may determine these selection processes, there are also, at least for the researcher, unobservable characteristics, such as personal abilities and employment history of the founder, capital endowment or transition costs, which may influence both, programme participation and firm success. Neglecting such selection effects can result in inconsistent estimates. Therefore, the econometric framework of programme evaluation seems to be appropriate when studying the impact of bridging allowance on the success of the firm. Whereas selection on observable characteristics can be handled more or less easily, the existence of selection on unobservables requires either panel data or econometric models assuming a certain joint distribution of the selection process and the measure of success (see Section 4.2). As a consequence, a dummy endogenous regression model seems to be appropriate to assess the impact of bridging allowance.

Transferring the evaluation model of Chapter 4 to the study of firm success and subsidisation with bridging allowance results in the following equation:

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94 See e.g. Heckman et al. (1999) or the discussion in Chapter 4.

95 Firm foundation by the unemployed and subsidisation with bridging allowance is synonymous, as hardly any unemployed would start a business without bridging allowance. For a detailed discussion on this, see Pfeiffer and Reize (2000a,b), Reize (2000) as well as Section 2.3.

$$y_i = x_i'\beta + d_i\gamma + \varepsilon_i \,, \tag{8.1}$$

where y_i represents company success, x_i a vector of influential factors on company success, d_i bridging allowance and ε_i is assumed to be a normally distributed error term and being independent of x_i. In this formulation, the success of the enterprise depends on subsidisation, other observable factors and an error term. The equation of subsidised firm foundation on the basis of bridging allowance is given by:

$$d_i^* = w_i'\delta + u_i \tag{8.2}$$

where d_i^* represents a latent unobservable variable for which the following binary selection rule applies:

$$\begin{aligned} d_i &= 1 \quad if \quad d_i^* > 0\,. \\ d_i &= 0 \;\; otherwise \end{aligned} \tag{8.3}$$

Hence, if $d_i = 1$, the start-up is subsidised with bridging allowance and if $d_i = 0$, not. w_i represents the vector of the variables determining the type of start-up, while u_i is assumed to be a standard normally distributed error, which is independent of w_i. The variance-covariance-matrix of the two error terms is given by

$$V = \begin{pmatrix} \varepsilon_i \\ u_i \end{pmatrix} = \begin{pmatrix} \sigma_\varepsilon^2 & \sigma_{\varepsilon u} \\ \sigma_{\varepsilon u} & 1 \end{pmatrix}. \tag{8.4}$$

8.1.2 Modelling Firm Survival

The first measure of success is qualitative in nature and indicates whether the company is still active at a certain point of time after it was formed. For the analysis, six different measures of firm survival are used: surviving at least one year, at least two years, at least three years, at least four years, at least five years and surviving at all. These measures are constructed because of the nature of data (see Section 8.2 for more details). Starting from equations (8.1) and (8.2), the following system of two binary choice equations results:

$$s_{ij}^* = x_{ij}'\beta_j + d_i\gamma_j + \varepsilon_{ijs} \tag{8.5}$$

$$d_i^* = w_i'\delta + u_i \,. \tag{8.6}$$

s_{ij}^* and d_i^* represent unobservable latent variables, to which the following observation rules apply:

$$\begin{aligned} s_{ij} &= 1 \;\; if \;\; s_{ij}^* > 0, \quad enterprise \;\; survives\ at\ least\ j\ years \\ &= 0 \;\; otherwise \end{aligned}$$

and

$$d_i = 1 \ \text{if} \ d_i^* > 0, \quad \text{enterprise formed by an unemployed}$$
$$= 0 \ \text{otherwise}$$

ε_{ijs} as well as u_i are assumed to be a standard normally distributed error terms. Therefore, the variance-covariance-matrix of the error terms for each year j is given by

$$\Sigma_{sj} = Var\begin{pmatrix} \varepsilon_{ijs} \\ u_i \end{pmatrix} = \begin{pmatrix} 1 & \sigma_{\varepsilon_s uj} \\ \sigma_{\varepsilon_s uj} & 1 \end{pmatrix}. \tag{8.7}$$

Taking the correlation of the error terms into account, (8.5) and (8.6) are estimated simultaneously in the framework of a standard bivariate probit model, including an endogenous dummy variable. Estimation is carried out using full information maximum likelihood (FIML) methods.[96] The log-likelihood function appears as follows:

$$\ln L_{ij} = \begin{cases} \ln(\Phi_2[x_{ij}'\beta_j + \gamma_j,\ w_i'\delta, \rho_{\varepsilon_s uj}]) & \text{if } s_{ij} = 1 \text{ and } d_i = 1 \\ \ln(\Phi_2[\ x_{ij}'\beta_j, -w_i'\delta, -\rho_{\varepsilon_s uj}]) & \text{if } s_{ij} = 1 \text{ and } d_i = 0 \\ \ln(\Phi_2[-x_{ij}'\beta_j + \gamma_j, w_i'\delta, -\rho_{\varepsilon_s uj}]) & \text{if } s_{ij} = 0 \text{ and } d_i = 1 \\ \ln(\Phi_2[-x_{ij}'\beta_j, -w_i'\delta, \rho_{\varepsilon_s uj}]) & \text{if } s_{ij} = 0 \text{ and } d_i = 0 \end{cases} \tag{8.8}$$

where Φ_2 is the bivariate normal distribution and $\rho_{\varepsilon_s uj}$ the correlation coefficient between ε_{ijs} and u_i.

FIML estimation of (8.5) and (8.6) guarantees the identification of γ_j if w_i includes at least one variable which is not included in x_i and if the joint distributional assumption of the error terms is correct (see Heckman et al., 1999). Furthermore, the model is consistent iff the selection equations are recursive (see Gourieroux, 2000). This condition is met insofar as equation (8.5) can be expressed as a function of the exogenous variables x_i and w_i only.

The standard errors of the coefficients are estimated using the robust Huber/White/Sandwich estimator instead of the negative inverse of the Hessian matrix (see e.g. Binder, 1983 or White, 1982). This estimator does not assume a correct specification of the distribution of the likelihood function, but merely the independence of the observations. It is defined as:

$$\hat{V}(\hat{\Pi}) = H(\hat{\Pi})^{-1}\left(\frac{N}{N-1}\sum_{i=1}^{N} grad_i grad_i'\right)H(\hat{\Pi})^{-1}, \tag{8.9}$$

where $\hat{\Pi}$ is the vector of the estimated coefficients, H is the Hessian matrix and $grad_i$ is the gradient vector of the *i-th* observation.

The marginal effects for this model are calculated from the bivariate normal, conditional on being subsidised, i.e. $E[s \mid x, w, d = 1]$. For continuous variables the individual marginal effects consist of direct and indirect effects and have been computed according to the following equation (Greene, 1996, 1998):

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[96] The FIML estimation of dummy endogenous bivariate probit models has some advantages compared to the two step estimation (see Greene, 1998), e.g., the estimation of the standard errors is quite easier in the FIML than in the two step model.

$$
\begin{aligned}
&\partial\Phi_2(\Phi(x_{ij}'\beta_j+\gamma_j, w_i'\delta, \rho_{\varepsilon_s uj})/\partial x_{ijk} \\
&= \{\phi(x_{ij}'\beta_j+\gamma_j)\Phi((w_i'\delta-\rho_{\varepsilon_s uj}(x_{ij}'\beta_j+\gamma_j))/\sqrt{1-\rho_{\varepsilon_s uj}^2})\}\beta_{jk} \quad \textit{direct effect} \\
&+\{\phi(w_i'\delta)\Phi(x_{ij}'\beta_j+\gamma_j)-\rho_{\varepsilon_s uj}(w_i'\delta)/\sqrt{1-\rho_{\varepsilon_s uj}^2})\}\delta_k \quad \textit{indirect effect}
\end{aligned}
\tag{8.10}
$$

where $\Phi(.)$ is the cumulative standard normal distribution, $\phi(.)$ the standard normal density and the index k stands for the *k-th* exogenous variable. For exogenous dummy variables the individual marginal effect is

$$E[s_{ij}^{*} \mid x_{ijk}=1, w_i, d_i=1] - E[s_{ij} \mid x_{ijk}=0, w_i, d_i=1] \tag{8.11}$$

and for the endogenous dummy variable

$$E[s_{ij}^{*} \mid x_{ij}, w_i, d_i=1] - E[s_{ij}^{*} \mid x_{ij}, w_i, d_i=0], \tag{8.12}$$

where E represents the expectation operator. It should be well noted that in the former equation, $d_i = 1$ refers to the subsidisation equation and in the latter to the dummy in the survival equation, where the expectation of s_{ij}^{*} is still conditional on being subsidised. The reported marginal effects are calculated at the mean of the exogenous variables.

8.1.3 Modelling Employment Growth

8.1.3.1 Bivariate Selection Rule

The estimation of employment growth proceeds in a similar framework. However, two further selection problems have to be taken into account. The first additional selection problem arises from the fact that employment growth is not observed for all firms. A growth rate can be determined only for the surviving, i.e. the successful companies. However, measurement of growth is required not only for these companies but for all start-ups. An estimate using the sample of the surviving companies can overestimate effects on employment growth ("Survivor-Bias"). A further selection problem might be a result of the sample studied, since information on employment growth is missing for 54.1% of the enterprises in the West German sample states and 54.2% in the East German sample. It cannot be ruled out that for companies with worse development, more information is available, as these companies are better examined due to the specific objective of the set of data used for this study. For enterprises with payment difficulties in particular, inquiries to the association "Verband der Vereine Creditreform" (VVC – Creditreform, the largest German credit rating agency), which is the provider of the data set, by suppliers and customers will be made more frequently (for more details see Section 8.2 or Harhoff et al., 1998).

Thus, when estimating employment growth, two concurring selection mechanisms are at work. The probability that there is a usable statement on employment for a firm depends (i) on the variables determining the survival probability and (ii) on the variables evaluating the payment histories and the credit worthiness of a

company. Since, for estimation purposes, we are interested only in controlling for these selection biases in order to get unbiased estimates of the coefficients in the output equation rather than in estimating the structural form of these two selection processes, both selection mechanisms are modelled within one equation.

Hence, two selection processes have to be addressed when estimating the effect of subsidisation with bridging allowance on employment growth: the classical Heckman selection problem that employment growth is only observed for a non-random sub-population, and the selection bias arising from non-random firm foundation by the unemployed. From this, a somewhat extended model as compared to (8.1) and (8.2) emerges, which consists of three equations with a linear output equation and a bivariate selection rule:

$$g_i = x_i'\beta + d_i\gamma_g + \varepsilon_{ig}, \tag{8.13}$$

$$d_i^* = w_i'\delta + u_i, \tag{8.14}$$

$$b_i^* = z_i'\omega + d_i\gamma_b + v_i, \tag{8.15}$$

to which the following observation rules apply

$$d_i = \begin{cases} 1 \text{ if } d_i^* > 0 \\ 0 \text{ otherwise} \end{cases},$$

$$b_i = \begin{cases} 1 \text{ if } b_i^* > 0 \\ 0 \text{ otherwise} \end{cases}.$$

The employment growth rate g_i is defined as

$$g_i = \frac{\ln E_i(t_{i2}) - \ln E_i(t_{i1})}{t_{i2} - t_{i1}} \tag{8.16}$$

with $\ln E_i(t_{i\tau})$ being the logarithm of the number of employees at the time of examination $t_{i\tau}$.[97] t_{i1} and t_{i2} are chosen in such a way that the point of t_{i1} is the earliest statement on employment and t_{i2} corresponds to the number of employees as determined by the most recent observation of the firm.

Employment growth g_i is observed iff $b_i=1$. In equation (8.13), x_i again represents a vector of covariates influencing firm success with the corresponding vector of coefficients β and is assumed to be independent of the error term ε_{ig}. ε_{ig} is assumed to be normally distributed with a mean of zero and variance σ_ε^2. Again, γ_g measures the impact of the bridging allowance d_i on employment growth. Equation (8.14) is identical to (8.2) and (8.6), respectively. Finally, in equation (8.15) z_i is a vector of additional variables explaining the observation mechanism for employment growth g_i and v_i is assumed to be a standard normally distributed error term. z_i and v_i are assumed to be independent, whereas d_i is supposed to be endogenous, as in equation (8.13). The effect of d_i is captured by γ_b.

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[97] This specification has been used in literature on firm growth before. See e.g. Evans (1987a).

The correlation between the error terms is left unrestricted. Therefore, the tri-variate structure of the model leads to the following variance covariance matrix:

$$\Sigma_g = Var\begin{pmatrix} \varepsilon_{ig} \\ u_i \\ v_i \end{pmatrix} = \begin{pmatrix} \sigma_\varepsilon^2 & \sigma_{\varepsilon_g u} & \sigma_{\varepsilon v} \\ \sigma_{\varepsilon_g u} & 1 & \sigma_{uv} \\ \sigma_{\varepsilon v} & \sigma_{uv} & 1 \end{pmatrix}. \tag{8.17}$$

For γ_g and γ_b the same identification assumptions apply as for the survival model. Identification of γ_g and γ_b is guaranteed if w_i includes at least one variable which is included neither in x_i nor in z_i and if the joint distributional assumption of the error terms is correct. Furthermore, the model is also consistent insofar as equation (8.13) can be expressed as a function of exogenous variables only and equation (8.15) as a function of the exogenous variables z and w.

8.1.3.2 The Two-Step Estimator

A natural starting point for estimation would be an extension of Heckman's two-step estimator of the univariate selection model to the bivariate selection rule. In the first step, equations (8.13) and (8.14) are estimated using a bivariate probit model to obtain the inverses of Mill's ratio, which are defined as:

$$\lambda_{ui} = \begin{cases} \phi[w_i'\delta]\dfrac{\Phi[(z_i'\omega + d_i\gamma_b - \rho_{uv}w_i'\delta)/(1-\rho_{uv}^2)^{1/2}]}{\Phi_2[w_i'\delta, z_i'\omega + d_i\gamma_b, \rho_{uv}]} & if\ d_i = 1 \\ -\phi[w_i'\delta]\dfrac{\Phi[(z_i'\omega + d_i\gamma_b - \rho_{uv}w_i'\delta)/(1-\rho_{uv}^2)^{1/2}]}{\Phi_2[-w_i'\delta, z_i'\omega + d_i\gamma_b, -\rho_{uv}]} & if\ d_i = 0 \end{cases}, \tag{8.18}$$

$$\lambda_{vi} = \begin{cases} \phi[z_i'\omega + d_i\gamma_b]\dfrac{\Phi[(w_i'\delta - \rho_{uv}(z_i'\omega + d_i\gamma_b))/(1-\rho_{uv}^2)^{1/2}]}{\Phi_2[w_i'\delta, z_i'\omega + d_i\gamma_b, \rho_{uv}]} & if\ d_i = 1 \\ \phi[z_i'\omega + d_i\gamma_b]\dfrac{\Phi[(-w_i'\delta + \rho_{uv}(z_i'\omega + d_i\gamma_b))/(1-\rho_{uv}^2)^{1/2}]}{\Phi_2[-w_i'\delta, z_i'\omega + d_i\gamma_b, -\rho_{uv}]} & if\ d_i = 0 \end{cases}. \tag{8.19}$$

In the second step, g_i is linearly regressed on x_i, d_i, λ_{ui} and λ_{vi}, which yields

$$g_i = x_i'\beta + d_i\gamma_g + \lambda_{ui}\sigma_{\varepsilon u} + \lambda_{vi}\sigma_{\varepsilon v} + \varepsilon_i \cdot \tag{8.20}$$

Ordinary least squares estimation of (8.20) produces consistent estimates of β, γ_g, $\sigma_{\varepsilon u}$ and $\sigma_{\varepsilon u}$, however the estimated standard errors are inconsistent. A correction of the standard errors would be exceedingly cumbersome (see Greene, 1995). At this stage it should be noted that a zero correlation between u_i and v_i would lead to a dramatic simplification of the model (see Greene, 1998). In this case the Mill's ratios would be computed from two independent probits and correction of the standard errors would be the same as for the traditional Heckman model. But it should also be noted that solely a zero value for either $\sigma_{\varepsilon u}$ or $\sigma_{\varepsilon v}$ would still lead to a complex structure of the Mill's ratio (inclusion of the bivariate normal distribu-

tion) and its derivative, respectively.[98] Therefore, the next step in solving the estimation problem is to proceed with FIML estimation.

8.1.3.3 The Full Information Maximum Likelihood Estimator

To account for the possible correlation between the three error terms, the model can be estimated in one step (i.e. fully simultaneously) using FIML techniques. In contrast to the two-step procedure, such techniques will produce consistent as well as fully efficient estimates. As we have a bivariate selection rule, there are four different types of contribution to the log-likelihood function. Let us first define

$$\eta_d = \frac{w_i'\delta + \frac{\rho_{\varepsilon u}}{\sigma_\varepsilon}(g_i - x_i'\beta)}{\sqrt{1-\rho_{\varepsilon u}^2}} \quad \text{and} \tag{8.21}$$

$$\eta_b = \frac{z_i'\omega + d_i\gamma_b + \frac{\rho_{\varepsilon v}}{\sigma_\varepsilon}(g_i - x_i'\beta)}{\sqrt{1-\rho_{\varepsilon v}^2}}, \tag{8.22}$$

where $\rho_{\varepsilon u} = \frac{\sigma_{\varepsilon u}}{\sigma_\varepsilon}$ and $\rho_{\varepsilon v} = \frac{\sigma_{\varepsilon v}}{\sigma_\varepsilon}$. This leads to the log-likelihood function, which is defined as

$$\ln L = \begin{cases} \ln(\Phi_2[-w_i'\delta, -z_i'\omega, \rho_{uv}]) & \text{if } d_i=0 \text{ and } b_i=0 \\ \ln(\Phi_2[w_i'\delta, -z_i'\omega, -\rho_{uv}]) & \text{if } d_i=1 \text{ and } b_i=0. \\ \ln(\Phi_2[-\eta_d, \eta_b, -\rho_{uv}]) - \frac{1}{2}\ln(2\pi) - \ln(\sigma_\varepsilon) - \frac{1}{2}\left(\frac{g_i - x_i'\beta}{\sigma_\varepsilon}\right)^2 & \text{if } d_i=0 \text{ and } b_i=1 \\ \ln(\Phi_2[\eta_d, \eta_b, \rho_{uv}]) - \frac{1}{2}\ln(2\pi) - \ln(\sigma_\varepsilon) - \frac{1}{2}\left(\frac{g_i - x_i'\beta}{\sigma_\varepsilon}\right)^2 & \text{if } d_i=1 \text{ and } b_i=1 \end{cases} \tag{8.23}$$

As we can see from equation (8.23), the extension of the univariate selection rule to a bivariate rule is obvious.[99] The main differences are (i) the additional correlation parameter ρ_{uv} between the selection equations, (ii) the implementation of the bivariate normal distribution Φ_2 instead of the normal distribution and (iii) two more regimes for which the output equation can be selected.

From equation (8.23) the mixture between the treatment and the selection model can be seen. Whereas the output regression does not contribute to the log-

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[98] To correct the standard errors, derivatives of Mill's ratios (which are non-linear functions of the cumulative bivariate normal distribution) are needed.

[99] For the derivation of the log-likelihood function of the traditional Heckman selection model see, e.g., Amemiya (1985) or Nawata (1994). Di Tomasso (1999) employs a similar log-likelihood function for a trivariate structure. However, she estimates two probits as output equations including a continuous endogenous variable.

likelihood function if $b_i = 0$, it is included in both regimes of d_i. Finally, equation (8.23) shows the parameters which are estimated. Beside the coefficients, including the impact of the endogenous bridging allowance variable on firm growth, γ_g, four more structural parameters are estimated. These are the correlation coefficients either between growth and subsidisation, $\rho_{\varepsilon u}$, or between growth and the probability that growth is observed, $\rho_{\varepsilon v}$. Furthermore, the correlation coefficient between the selection equations ρ_{uv} is estimated, as well as the standard error of the growth equation σ_ε. Finally, the standard errors of the coefficients are again estimated using the robust Huber/White/Sandwich estimator instead of the negative inverse of the Hessian matrix and estimation is carried out using Stata's ML method (see Stata, 2000).[100]

8.2 Data, Variables and Descriptives

8.2.1 Data

The econometric analysis is based on a regional sample of the ZEW Firm Start-Up Panel (ZFSP).[101] The observation unit is the legally independent enterprise and not the operational facility. The ZFSP contains newly registered enterprises in West and East Germany. The information is updated, but not in regular time intervals, and includes the legal form, a five-digit industry code, number of employees and employee structure, date of formation (for take-overs also the date of formation of the predecessor company), date of trade register entry, turnover, number and socio-economic characteristics of shareholders, debt composition and information on a shut-down other than by bankruptcy or collection proceedings.

Since there are no official statistics in the Federal Republic of Germany which cover company start-ups completely, reliably, and with sufficient time disaggregation, statements on the degree to which new companies are contained in the ZFSP are only possible with limitations. Not all companies are required to be officially registered. The probability of being registered is influenced by firms' need for loans and the extent of their business relationships to other companies. Very small companies, agricultural enterprises and professionals in medicine, law and architecture are likely to be under-represented.

The sample used in this study is constructed in two steps. First, it consists of *all* people (approximately 123,000 in wave 1 to 12 of the ZFSP) contained in the database who are involved in an enterprise and whose addresses lay in the postal code areas of the 15 labour market districts examined in the course of the §55a-

[100] The estimator "biheck" is programmed in Stata's Version 6.0. The programme code together with a help-file can be obtained by the author upon request.

[101] The data in the ZEW Start-Up Panel has been made available to the ZEW every six months since 1989 by the Association "Verband der Vereine Creditreform" (VVC). For further details, see Harhoff and Steil (1997).

sample of the IAB (see Chapter 3). In the context of a co-operative project with the IAB, those people in the sample who received bridging allowance are identified. In a second step, a sample of enterprises started by these people is compiled. This sample thus includes companies in which unemployed persons receiving bridging allowance are involved and companies for which this is not the case.[102] An enterprise is categorised as being started by an unemployed, and hence being subsidised with bridging allowance, if at least one person involved in this enterprise received this kind of subsidisation. To guarantee a clear distinction between subsidised and non-subsidised start-ups, all firms founded by people, for whom the match of the addresses is not perfect, are excluded from the sample, since for those persons it cannot be said for sure whether they are subsidised or not, i.e. whether they are treatments or controls. For the same reason, non-subsidised firms enter the sample only if all of their shareholders reside in the area of the 15 labour market districts contained in the §55a-sample. Since only the full census of the addresses of bridging allowance recipients living in these distinct labour market districts are available to us, we are not able to identify whether a person living outside of these districts is subsidised or not.

Only the cohort of companies which were set up between the 4th quarter of 1993 and the first half of the 3rd quarter of 1995 is considered.[103] Start-ups which are not eligible for subsidisation according to Labour Promotion Law (non-profit associations, agricultural enterprises) have been excluded. In addition the sample is restricted to small and medium sized start-ups. The aim of this restriction is again to exclude types of start-ups which are not applicable to the unemployed. Start-ups with 100 or more employees are usually founded by already existing firms and not by individuals.[104]

After the selection, the sample taken from the eleven labour market districts in the old federal states includes 6,031 enterprises, of which 237 were founded by an unemployed person receiving bridging allowance. The sample from the four labour market districts in the new federal states includes 5,323 enterprises, of which 426 are subsidised with bridging allowance.[105] Due to missing values for year-specific mortality status, age of firm at the first observation, initial employment,

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[102] A company may be registered outside the 15 labour market districts of the IAB census, as the address of the firm can differ from the address of the shareholder(s).

[103] This means that the period analysed by the IAB is always extended by a quarter, as there is the possibility that an application for a trade register entry was filed before the subsidies were granted, or that a company was formed some time after the support was granted.

[104] Often a boundary of only 50 employees is used. See, e.g., Fritsch (1992).

[105] Thus 1,741 additional firms are identified of which 45 are subsidised as compared to a previous study (Pfeiffer and Reize, 1998 or Pfeiffer and Reize, 2000b). As start-ups can enter the panel with some delay, the six additional waves of the ZFPS which are available for this study, increase the number of firm start-ups for all cohorts.

industry, gender and age[106], the number of observations for the different types of estimation may be reduced.

8.2.2 Firm Heterogeneity and Subsidisation of the Unemployed

The factors *w* which characterise the heterogeneity of start-ups and which are included in the econometric specification of equation (8.2), (8.6) and (8.14), respectively, are: age of firm at first observation, initial firm size, legal form, industry, type of foundation (original or derivative)[107], shareholder structure, unemployment to vacancy ratio and the legal arrangement of bridging allowance.[108]

Following the discussion in Chapter 7, firms that are formed by unemployed people should, as a rule, be rather small, "easily" founded firms with low capital endowment. Indeed, subsidised start-ups are smaller than their non-subsidised counterparts with two employees (including the shareholders) compared to 2.8 employees in the western parts of Germany (see Table 15)[109]. In East Germany, the initial firm size is larger than in West Germany, but nevertheless non-subsidised firms with an average size of 3.4 employees are on average 1.4 employees larger than subsidised firms. The difference in the firm size, however, is to some extend relativized as non-subsidised firms are older than subsidised firms when they are first observed. In West Germany non-subsidised firms are on average 65 days older than subsidised firms. In East Germany this difference amounts to 44 days.

The legal form is divided into three categories: sole proprietorship or trade enterprise, non-corporate firm and corporation. A sole proprietorship ("Einzelunternehmung"), i.e., individual proprietorships run by the owner and with at most one dormant partner, can be registered and closed down without great formalities, while the set-up of a limited liability company, a corporation, requires an entry in the trade register and the deposit of nominal capital. As a rule, this requires a notary certification.

For this reason, I hypothesise that start-ups by the unemployed do not have the legal form of a corporate firm. The category of non-corporate firm consists of the civil law association ("BGB-Gesellschaft") and limited and general commercial partnership ("Komanditgesellschaft" and "Offene Handelsgesellschaft"), where two or more persons are owners and share full responsibility for the firm's development. In the old German federal states, 63.7% of subsidised start-ups are sole proprietorships and 15.6%, are non-corporate firms. In the new German federal states, non-corporate firms occur more frequently comprising 18.1% of subsidised

[106] To prevent a large reduction (almost 50%) of the sample size in East Germany, a category "age of most important shareholder is missing" is constructed. For more details see the next sections.

[107] Derivative firms are e.g. take-overs.

[108] Table 14 shows the definitions of the variables used in the different equations.

[109] Table 15 provides some descriptive statistics on firm heterogeneity for West and East Germany.

start-ups. Although sole proprietorships make up a large share of the subsidised firms in the East with 68.8%, this share is lower than for non-subsidised start-ups. Subsidised start-ups are thought to be more common in the service and construction sectors where market entry costs and capital intensity are relatively low. This is confirmed for East Germany, where subsidised firms are more often started in retail and wholesale trade. In the western regions of Germany, the picture is not that clear. There, subsidised firms are more often involved in the construction and manufacturing sector as well as in data processing.

The type of start-up found among subsidised firms differs between the East and West. In the old federal states, subsidised start-ups are more likely to be derivative than non-subsidised start-ups, whereas in the new federal states non-subsidised firms are more often derivative. Even if in West Germany the share of derivative firms among the subsidised is higher than among the non-subsidised, at 1.3% this share is very small.

In both parts of Germany subsidised firms tend to have more shareholders than non-subsidised firms. However, around 70% of the firms founded by an unemployed individual have only one shareholder.

Apart from business-related characteristics, firm foundation by the unemployed may depend on the economic environment included in the regression in the form of the regional unemployment to vacancy ratio three months prior to the start-up. The higher this number, the lower the chances of the unemployed finding regular employment. Thus, I hypothesise that, ceteris paribus, the probability for a decision in favour of self-employment increases with a higher unemployment to vacancy ratio. From my point of view, the unemployment to vacancy ratio reflects the tightness of the regional labour market better than the unemployment ratio.[110] The highest average value of the unemployment to vacancy ratio for the period of time examined is found in Bremen with 12.14, the lowest one in Landshut with 0.72. In the labour market districts of Hannover and Kassel, the number of subsidised enterprises and the unemployment to vacancy ratio is relatively high (see Figure 19). On average, the unemployment to vacancy ratio is higher among subsidised firms than among non-subsidised. In the new German federal states, there seems to be no obvious relationship between the two variables. The unemployment to vacancy ratio is even lower in the sample of subsidised firms as compared to the sample of non-subsidised firms. A further important determinant of subsidised firm foundation is the legal arrangement of bridging allowance. As shown in Section 2.3, the amount of bridging allowance as well as the duration of subsidisation varied between the years of 1994 and 1995. In August 1994, grants were greatly increased, which in turn led to a rapid increase in the number of subsidised start-ups. Therefore, it is not surprising that in both parts of Germany the share of firms founded by an unemployed individual is the highest in the fourth quarter of 1994 and the first quarter of 1995.

[110] Estimations with different measures of the tightness of the labour market showed that the unemployment to vacancy ratio is the most suitable. This is also shown by Pfeiffer and Reize (1999a), where the impact of the push- and pull-factors on the intensity of firm foundation is tested for West and East Germany.

Table 14: Variables and Definitions

Variables	Definitions
Survival probability	6 different measures of survival probability: firm has survived at least 1 year, at least 2 years, at least 3 years, at least 4 years, at least 5 years and has survived during the period of observation
Employment growth	See equation (8.16)
Time of observation	Period in days between the first time of observation and the last time of observation of the firm
Bridging allowance	1: subsidised start-up with bridging allowance; 0: not subsidised
Initial firm size	Number of employees at first time of observation
Legal form	Three categories: corporate firm (reference category), non-corporate firm, trade enterprise/sole proprietorship
Industry	10 categories: construction (reference category), manufacturing, wholesale trade, retail trade, hospitality, communication/transportation, finance/insurance/real estates/housing, data processing, business related services, other services
Derivative	1: derivative foundation; 0: original foundation
Diversified	1: firm is active in at least two industries; 0 firm is active in solely one industry
Networks	1: most important shareholder of the firm is involved in one or more other firms; 0 otherwise
Gender	1: female; 0: male
Age	8 categories: under 25 (reference category), from 25 to under 30, 30 to under 35, 35 to under 40, 40 to under 45, 45 to under 50, 50 to under 55 and 55 upwards; for East Germany one additional category: information on age is missing
Region	9 categories for West Germany: the labour market districts of Bremen, Hannover, Kassel, Essen, Hof/Bayreuth, Bad Kreuznach/Mainz, Deggendorf/Landshut, Göppingen and the regions outside of these districts (reference category); 5 categories for East Germany: the labour market districts of Schwerin, Berlin, Pirna, Dessau and the regions outside of these districts (reference category)
Cohort of observation	23 categories: firm is first observed in the year 1993 and before (reference category), in 1994, between 1994/95, between 1994/96, between 1994/97, between 1994/98, between 1994/99, between 1994/2000, in 1995, between 1995/96, between 1995/97, between 1995/98, between 1995/99, between 1995/2000, in 1996, between 1996/97, between 1996/98, between 1996/99, between 1996/2000, in 1997, between 1997/98, between 1997/99, between 1997/2000, in the year 1998 or later
Cohort of foundation	3 Categories: foundation in 1993, in 1994 and in 1995
Unemployment to vacancy ratio	Ratio of the number of unemployed people and the inflow of vacancies in the labour market district where the most important shareholder is registered, 3 months before the date of foundation
Firm age	Age of firm in days at the time of initial observation
Number of additional shareholders	4 categories: no additional shareholders (reference category), one additional shareholder, two additional shareholders, three or more additional shareholders
Legal arrangement of bridging allow.	8 categories: quarter of foundation is 1993/4, 1994/1, 1994/2, 1994/3 (reference category), 1994/4, 1995/1, 1995/2 and 1995/3

Payment histories	7 categories: firm pays bills without delay, no information with respect to the payment behaviour of the firm (reference category), payment is within 30 days, payment takes longer, pays slowly, payment after reminder, payment overdue
Credit worthiness	5 categories: credit is possible or advised, no credit experience (reference category), limited credit, secured credit, no credit recommended

Note: Definitions in accordance with the ZFPS.

Table 15: Firm Heterogeneity and Subsidisation

	West Germany		East Germany	
Variables	Non-subsidised	Subsidised	Non-subsidised	Subsidised
U/V-ratio	3.8 (4.0)	4.3 (3.8)	3.4 (2.9)	2.9 (1.7)
Age of firm at first observation/100	213.4 (348.6)	147.8 (241.6)	314.4 (307.3)	269.5 (289.7)
Missing values (in %)		12.0		4.1
Initial Firm Size	2.8 (4.6)	2.0 (1.8)	3.4 (5.0)	2.3 (2.3)
Missing values (in)		12.0		4.1
Legal firm				
Corporate firm	31.4	20.7	18.5	13.2
Non-corporate firm	8.0	15.6	10.6	18.1
Trade enterp./sole proprietorship	60.6	63.7	70.8	68.8
Industry				
Construction	14.1	18.4	22.8	21.9
Manufacturing	9.9	15.4	7.9	9.0
Missing value		1.5		1.1
Wholesale trade	7.6	7.3	7.3	9.7
Retail trade	24.6	23.5	21.6	25.5
Hospitality	10.8	6.4	9.1	6.4
Communication/transportation	4.9	3.4	5.5	5.4
Finance/insurance/real est./housing	6.7	3.9	8.1	5.9
Data processing	3.2	6.8	0	0
Business related services	7.3	9.0	7.9	9.4
Other services	10.9	6.0	9.8	6.6
Derivative	0.4	1.3	1.6	0.7
Quarter of foundation				
Quarter 93/4	12.6	4.2	11.5	6.6
Quarter 94/1	10.6	11.8	15.2	12.7
Quarter 94/2	17.0	14.4	16.7	11.5
Quarter 94/3	7.4	5.5	11.6	12.4
Quarter 94/4	14.1	25.3	10.6	21.8
Quarter 95/1	14.6	28.3	13.4	23.7
Quarter 95/2	13.3	8.9	14.8	10.6

Quarter 95/3	10.5	1.7	6.3	0.7
Number of additional shareholders				
No additional shareholders	73.6	67.9	80.0	72.1
One additional shareholder	20.4	21.9	15.8	21.1
Two additional shareholders	4.1	5.9	3.3	5.6
Three and more add. shareholders	1.9	4.2	0.8	1.2

Notes: (i) Regional sample of the ZFPS, (ii) shares of discrete variables in %, (iii) standard deviations of continuos variables in parentheses. (iv) For the definition of the variables see Table 14.

Figure 19: Mean Unemployment to Vacancy Ratio of the 15 Research Labour Market Districts from July 1993 to May 1995

Notes: Regional sample of the ZFSP, Federal Employment Services, own calculations.

8.2.3 Factors Influencing Company Success and Firm Selection

Companies formed by unemployed people possibly have, due to their comparably low endowment of tangible assets and human capital, worse chances for surviving and growing. The analysis takes into account observed firm heterogeneity by including either factors derived from an industrial economics approach like initial employment, legal form, industry and region, or from a labour economics ap-

proach including age and gender. Moreover, to control for organisational factors, networks and the type of foundation (original or derivative) are included (see Chapter 7). Finally to account for business cycles, dummy variables indicating the different combinations of t_1 and t_2 on a yearly basis are included in the growth equation. The survival equation includes dummies controlling for the year of foundation.[111]

Companies which receive loans show a tendency to take higher risks after market entry since they can shift their profit expectations to their benefit and at the cost of their creditors. This is especially true for limited liability companies, which are not liable for the full amount of their values when they set up a risky company or one with little chance to survive.[112] On the other hand, the higher readiness to take risks can also result in higher profits if the company survives.

According to the liability of smallness hypothesis, smaller firms have lower survival probabilities (see Brüderl et al., 1992 as well as Chapter 7). Due to higher sunk costs, bigger firms prepare their market entry better and put greater effort into the choice of their projects (see Troske, 1995). In this sense, not only initial firm size but also legal form represent indicators for otherwise unknown planning intensity. In the literature, initial employment also serves to check the relevance of Gibrat's Law, according to which the growth of a company is independent of its size (see Evans, 1987b or Hall, 1987). The mean initial firm size for firms surviving the observation period is 2.9 for the western parts of Germany, whereas non-surviving firms start on average with 2.6 employees (see Table 16). In the eastern parts of Germany this is reversed. Surviving firms have on average an initial firm size of 3.2 employees as compared with an initial firm size of 3.5 employees for firms that do not survive. As already shown in the previous section, East German firms are larger than West German firms. At first glance, there seems to be no obvious relationship between initial firm size and firm growth, neither in the West nor in the East German states, which would confirm Gibrat's Law (see Figure 20).

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[111] Most of these variables are typically found in studies examining firm survival and employment growth on the basis of the ZFSP (see e.g. Harhoff et al., 1998). Table 14 shows detailed definitions of these variables.

[112] See Stiglitz and Weiss (1981). For an empirical examination of the influence of the legal form on insolvency, see Harhoff et al. (1998).

Table 16: Firm Heterogeneity and Survival

	West Germany		East Germany	
	Not survived	Survived	Not survived	Survived
Initial firm size	2.6 (3.8)	2.9 (4.8)	3.5 (5.1)	3.2 (4.6)
Missing values (in %)	12.0		4.1	
Legal form				
Corporate firm	24.5	31.4	18.2	17.0
Non-corporate firm	7.5	9.0	11.8	11.1
Trade enterp./sole proprietorship	68.1	59.6	69.9	71.9
Industry				
Construction	16.1	14.4	25.2	21.7
Manufacturing	7.9	11.2	6.2	9.1
Wholesale trade	7.4	7.8	7.8	7.2
Retail trade	25.2	25.1	22.1	21.5
Hospitality	15.1	9.3	11.9	7.2
Communication/transportation	5.9	4.6	5.9	5.3
Finance/insurance/real est./housing	5.5	6.6	6.3	8.9
Data processing	2.4	3.8	0.0	0.0
Business related services	7.3	7.0	6.9	8.6
Other services	7.2	10.2	7.6	10.3
Missing values (n %)	1.5		1.1	
Labour market district				
Other	13.3	8.6	—	—
Bremen	12.1	10.4	—	—
Hannover	14.8	13.7	—	—
Kassel	8.6	9.1	—	—
Essen	7.9	8.3	—	—
Hof/Bayreuth	6.3	8.9	—	—
Bad Kreuznach/Mainz	16.0	15.9	—	—
Deggendorf/Landshut	10.3	10.8	—	—
Göppingen	10.8	14.3	—	—
Other	—	—	20.1	13.1
Schwerin	—	—	33.5	33.0
Berlin (East)	—	—	9.6	11.3
Pirna	—	—	20.3	18.3
Dessau	—	—	16.4	24.4
Derivative	0.7	0.4	1.5	1.6
Diversified	12.4	13.7	17.2	14.7
Networks	13.7	10.9	28.1	20.4
Female	25.5	24.1	21.6	22.2
Missing values (in %)	2.1		22.1	

Age				
Age < 25	9.4	6.6	8.3	5.5
25 ≤age <30	18.7	19.4	12.4	9.9
30 ≤age <35	21.6	22.7	14.0	12.5
35 ≤age <40	17.8	16.8	11.5	11.1
40 ≤age <45	12.4	13.3	10.1	11.4
45 ≤age <50	9.9	9.3	6.2	6.2
50 ≤age <55	5.4	6.2	4.9	6.4
55 ≤age <84	4.7	5.7	3.0	2.7
Missing values (in %)	14.1		32.8	
Start-up cohort of 1993	12.3	12.3	10.7	11.4
Start-up cohort of 1994	50.8	48.9	54.6	54.2
Start-up cohort of 1995	36.9	38.8	34.8	34.4

Notes: (i) Regional sample of the ZFPS, (ii) shares of discrete variables in %, (iii) standard deviations of continuos variables in parentheses. (iv) For the definition of the variables see Table 14.

Figure 20: Average Employment Growth Rates in Firms in West and East Germany

Notes: (i) Regional sample of the ZFPS, (ii) own calculations.

In West Germany among surviving firms, corporations and non-corporations have a slightly higher proportion than among closures. 31.4% of the surviving firms are corporations and 9.0% are non-corporations. Again, in East Germany the opposite is true. 71.9% of the surviving firms are trade enterprises, whereas this share is only 69.9% for the close downs. In the old federal states corporate firms have the highest average growth rate with 0.087, followed by trade enterprises

(see Table 17). In the new federal states trade enterprises grow fastest with an annual growth rate of 0.078 and corporate firms slowest with a rate of 0.048.

Start-ups which are established in industry with relatively high market entry costs are supposed to survive longer than start-ups in low entry cost sectors. In both parts of Germany, start-ups in the manufacturing sector have a relatively high survival probability, whereas businesses in retail trade fail relatively often. The highest growth rates among West German firms are found in the wholesale trade, in the construction and in the communication and transportation sectors. In East Germany, start-ups grow fastest in communication, hospitality and manufacturing. Diversified firms should be able to react to changes in the market structure or in the taste of customers more flexibly and quickly than non-diversified start-ups. Hence, diversification might improve the stability and the success of the firm. On the basis of the descriptive statistics, this thesis is neither supported nor rejected. It seems that in East Germany, the survival probability is slightly higher among non-diversified start-ups, while the growth rate is higher among the diversified. In the West German states, non-diversified firms grow faster.

Derivative start-ups should have a higher survival probability, since, at the point of take-over, the new shareholders can rely on an already established managerial structure and an amount of customers. However, the survival probability may also be reduced compared to original foundations, if the take over is during the first two or three years after the original founding of the firm. From several empirical studies (e.g. Storey, 1994), it is known that the highest rate of failure is between the third and fifth year after foundation. As the age of the firm is measured with a starting point at the moment of the take-over, a derivative foundation may have already entered the phase of high failure rate, when it is observed. In the descriptive statistics, we observe hardly any differences in the survival probability between original and derivative foundations. Though the survival probability of derivatives may be higher, their chances of growth might be lower. At the point of take over, the possibilities of expansion may already be exhausted for the start-up. For East Germany this is true. The growth rate of derivatives is at 1.5% about 5.5 percentage points lower than for original start-ups. In West Germany, however, derivative start-ups grow faster than original ones.

The other organisational factor, networks, depicts the existence of business relationships of the most important shareholder to other firms. The network approach to entrepreneurship (Brüderl et al., 1996 as well as Chapter 7) faces the problem of finding a measure which is operational. In our study, a network refers to a firm, whose most important shareholder is also a shareholder of another firm. In accordance with the approach to entrepreneurship, networks should have a higher survival probability. However, the descriptive statistics show a lower survival probability for networks. In West Germany 13.7% of the non-surviving and only 10.9% of the surviving firms are networks. In the new federal states these shares are 28.1% and 20.4%, respectively. This result might be due to the way the measure of networks is constructed. It cannot be ruled out that some firms in the network are founded after the closure of another firm.[113] In the old federal states,

[113] The exact date of closure is only available for a few firms, see Section 8.2.4.

the growth rate for networks is higher than for non-networks. In the eastern states, no differences are apparent.

Human capital is approximated using the age of the most important shareholder. A better human capital endowment promises higher productivity of the founder (e.g. better management capabilities) and thus presumably a greater degree of success for the enterprise. Following the theory of investments in human capital (see e.g. Becker, 1985 or Mincer, 1974) individual endowment with human capital rises with the labour market experience, hence the age, of the individual. At the end of the employment life cycle, there might be a reduction of human capital due to the reduction in investments and due to the depreciation of formerly acquired human capital. Therefore, middle aged firm founders are supposed to be most successful. Younger entrepreneurs have a lack of human capital, especially a lack of managerial experience and older entrepreneurs are more likely to quit their business because of retirement considerations. Start-ups in which the shareholder is under the age of 25 have a relatively low rate of survival. However, in East Germany, this age-group exhibits the highest rate of employment growth. Fast growing firms are also found among shareholders aged between 25 and 35 in both parts of Germany and aged between 50 and 55 in the eastern part.

Furthermore, the gender of the most important shareholder is also controlled for. The descriptive statistics show no differences in the survival probability between firms managed by a man or a woman. However, women's enterprises show lower growth rates in East and West Germany.[114] Between one fourth and one fifth of the start-ups are run by a woman.

The inclusion of regional dummies allows for control of regional differences in start-up dynamics, capturing region-specific economic development or infrastructure. Most of the districts show only slight differences in survival probability. In the old federal states, firms started in Göppingen or Hof/Bayreuth have a relatively high survival probability and start-ups in Bremen grow fastest at an average rate of 0.127. In the new federal states the highest survival probability is found in the district of Dessau and the highest growth rate in the district of Pirna.

Finally, to capture differences in the business cycle, the year of foundation is controlled for. There are only small differences in the rate of survival between the years of 1993, 1994 and 1995. The differences for the several periods of observation in the growth equation are much larger. For West Germany the growth rates range from -0.011 in the period of 1995 to 1997 to 0.216 in the period of 1997 to 1997/98. In East Germany this range is even higher with a growth rate of -.378 for the 1996 cohort and a growth rate of 0.976 for the 1997 cohort.

114 This gender specific difference disappears in the multivariate analysis of Section 8.3.3. Hence, the difference in growth rates between males and females is based on different types of firm started by each gender.

Table 17: Firm Heterogeneity and Growth

	West Germany		East Germany	
	Mean	Standard deviation	Mean	Standard deviation
Growth equation				
Legal form				
Corporate firm	0.087	0.303	0.048	0.226
Non-corporate firm	0.032	0.152	0.052	0.195
Trade enterprise/sole proprietorship	0.074	0.341	0.078	0.334
Industry				
Construction	0.103	0.200	0.073	0.241
Manufacturing	0.077	0.284	0.104	0.407
Wholesale trade	0.135	0.632	0.084	0.249
Retail trade	0.046	0.276	0.049	0.208
Hospitality	0.044	0.207	0.126	0.523
Communication/transportation	0.100	0.186	0.142	0.571
Finance/insurance/real estates/housing	0.046	0.270	0.021	0.180
Data processing	0.072	0.193	—	—
Business related services	0.078	0.246	0.050	0.229
Other services	0.079	0.436	0.038	0.207
Missing values (in %)	1.5		1.1	
Derivative	0.110	0.134	0.015	0.211
None Derivative	0.075	0.316	0.070	0.303
Diversified	0.062	0.172	0.078	0.254
None diversified	0.077	0.334	0.068	0.310
Networks	0.091	0.403	0.071	0.395
None networks	0.073	0.302	0.069	0.269
Female	0.052	0.294	0.051	0.231
Male	0.082	0.322	0.051	0.231
Missing values (in %)	2.1		22.1	
Age of founder				
Age<25	0.051	0.452	0.118	0.239
25 ≤age < 30	0.087	0.228	0.103	0.429
30 ≤age < 35	0.086	0.246	0.094	0.421
35 ≤age < 40	0.067	0.257	0.061	0.232
40 ≤age < 45	0.068	0.217	0.044	0.183
45 ≤age < 50	0.064	0.155	0.046	0.187
50 ≤age < 55	0.066	0.228	0.097	0.454
55 ≤age < 84	0.067	0.576	0.068	0.298
Missing values (in %)	14.1		32.8	
Labour market district				
Other	0.085	0.346	—	—

Bremen	0.127	0.568	—	—
Hannover	0.088	0.364	—	—
Kassel	0.024	0.367	—	—
Essen	0.089	0.230	—	—
Hof/Bayreuth	0.082	0.219	—	—
Bad Kreuznach/Mainz	0.075	0.211	—	—
Deggendorf/Landshut	0.058	0.192	—	—
Göppingen	0.054	0.197	—	—
Other	—	—	0.076	0.239
Schwerin	—	—	0.040	0.279
Berlin (East)	—	—	0.080	0.466
Pirna	—	—	0.097	0.262
Dessau	—	—	0.084	0.305
Cohort of observation				
Coho93v	0.078	0.248	-0.001	0.173
Coho9494	0.126	1.084	0.297	0.427
Coho9495	0.149	0.434	0.376	1.265
Coho9496	0.061	0.249	0.038	0.265
Coho9497	0.032	0.204	0.073	0.192
Coho9498	0.040	0.126	0.013	0.144
Coho9499	0.064	0.157	0.089	0.176
Coho9400	0.098	0.149	0.064	0.166
Coho9595	0.109	0.487	—	—
Coho9596	0.061	0.409	0.043	0.252
Coho9597	-0.011	0.278	0.057	0.246
Coho9598	0.055	0.151	0.038	0.191
Coho9599	0.062	0.163	0.079	0.185
Coho9500	0.096	0.178	0.076	0.181
Coho96n	0.562	2.210	—	—
Coho9696	—	—	-0.378	0.534
Coho9697	—	—	0.045	0.527
Coho9698	0.044	0.245	-0.008	0.231
Coho9699	0.074	0.215	0.079	0.231
Coho9600	0.107	0.180	0.039	0.215
Coho97n	0.216	0.549	—	—
Coho9797	—	—	0.976	2.248
Coho9798	—	—	0.001	0.323
Coho9799	0.078	0.248	0.035	0.208
Coho9700	0.078	0.263	0.053	0.289
Coho98n	0.143	1.047	0.018	0.179

Note: (i) Regional sample of the ZFPS. (ii) Values for the mean are growth rates. (iii) For the definition of the variables see Table 14.

For the selection equation (8.15), in addition to the already mentioned x variables, credit worthiness and the payment history of the company are introduced. The possibility of being selected that is surviving and being investigated at least twice, is highest among firms paying bills without delay and firms which pay slowly (see Table 18). This contrary result may reflect the two contrary selection processes of survival and investigation (see Section 8.1.3). The same matters for the influence of credit worthiness. Firms to whom credit lending is advised or possible as well as firms with limited credit worthiness are more likely to be selected for employment growth estimation.

Table 18: Firm Heterogeneity and Selection

	West Germany		East Germany	
	Not selected	Selected	Not selected	Selected
Payment histories				
Pays bills without delay	14.7	75.6	24.6	77.2
No experience with respect to payment behav.	47.8	3.4	26.9	3.5
Payment within 30 days	0.2	3.8	0	0
Payment takes longer	3.4	2.5	3.7	3.0
Pays slowly	5.3	13.0	4.9	12.4
Payment after reminder	2.5	0.9	4.2	1.5
Payments overdue	26.0	0.9	35.7	1.0
Credit worthiness				
Credit advised or possible	10.6	70.4	6.3	29.0
No credit experience	53.7	4.2	36.4	5.4
Limited credit	5.2	21.4	16.7	60.3
Secured credit	3.2	2.2	3.1	3.0
No credit recommended	27.2	1.7	37.6	2.4

Notes: (i) Regional sample of the ZFPS, (ii) shares of discrete variables in %; (iii) for the definition of the variables see Table 14.

8.2.4 Survival Probability and Employment Growth

For success variables, this study uses one-year, two-year, three-year, four-year and five-year survival status as well as employment growth. Due to processing delays, the data collection of June 2000 only has sufficient information available on companies up to the year 1999. Since the founder cohort of the years 1994 and 1995 are being examined, the time frame for the observations is restricted to approximately four years after set-up. However, a survival rate is also computed for the first five years, but the number of observations is halved in this model.

A company can be closed down by choice or by force (insolvency).[115] For enterprises no longer active, the start-up database only gives an exact date of closure for insolvency cases. For voluntary closures, the date of mortality can be determined only by means of approximation between two points in time at which the company was examined by the VVC. If it turns out at an examination date that the firm is no longer alive, then it is only known that it had been closed at some point between that and the previous time of examination. This period between individual points of examination can vary significantly between enterprises, ranging from a few weeks to more than two years.

Because of this lack of an exact date of closure and the differing lengths of the intervals, the binary probability "that a company has survived at least j years" (see Section 8.1.2) is used as a measure for the success of a company.[116] Those companies which, at an age of less than j years, do not have close-down notices and/or whose first close-down is noted after more than j years, were excluded from the analysis.

In the western regions of Germany, 95.3% of the subsidised and 93.1% of the non-subsidised start-ups survive the first year, whereas in the eastern regions, 97.8% of the subsidised and 95.6% of the non-subsidised start-ups survive this period (see Table 19). 12.7% of all start-ups in the East and 26.5% in the West had to be excluded from the analysis, because it could not be determined whether they have survived the first year or not. During the next four years there is a steady decline in the rate of survival for subsidised and non-subsidised firms in both parts of Germany (see Figure 21 and Figure 22). The hazard rate for non-subsidised start-ups is somewhat higher than for subsidised. After four years of observation approximately 62% of non-subsidised firms and almost 75% of subsidised firms are still active. Between the fourth and the fifth year the hazard rate increases for all firms in the East and West. Around 53% of the subsidised start-ups survive the fifth year. The share of non-subsidised firms still active is only about 42%. A possible explanation for the rapid increase of firm mortality in the fifth year might be the high number of missing observations for this period of time. For 56.2% of the start-ups in the old federal states and for 46.2% in the new states, the survival status of the firm five years after foundation is unknown. It is very likely that most

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[115] Between 10 and 20% of closures within the first five years and 45% of all closures were involuntary in nature. The percentage is higher in the new German federal states with a share of involuntary closures between 19 and 34% for the first five years and of 58% for the whole observation period.

[116] Brüderl et al. (1996) employed the same measure. In principle, it is also possible to build up a duration model in discrete time, using yearly time intervals. Hence, the gain of additional information from such a model would be small, since a discrete duration model only pools the separate estimations, including additional parameters for time dependence. However, the main interest of our analysis is to assess the impact of bridging allowances on firm survival and not duration dependence. Moreover, a separate estimation allows for the measurement of different parameters for different periods of survival. To achieve this in a discrete duration model, an interaction of all covariates with the baseline hazard rate would be necessary.

of the firms for which the mortality status is missing are still active, since only around 15% of the firms (including the closures) can be observed for at least five years. Therefore, the percentage of firms surviving at least five years may rise with a longer period of observation. However, as the number of missing values do not differ between subsidised and non-subsidised start-up this would not have any effect on the estimated parameter of bridging allowance.

Table 19: Firm Survival and Growth

	West Germany		East Germany	
	Non-subsidised	Subsidised	Non-subsi-dised	Subsidised
One-year survival rate	93.1	95.3	95.6	97.8
Missing values (in %)	26.5		12.7	
Two-year survival rate	83.5	89.0	86.7	93.1
Missing values (in %)	31.1		19.1	
Three-year survival rate	73.5	83.2	74.9	84.6
Missing values (in %)	35.4		24.5	
Four-year survival rate	62.0	74.8	61.5	74.0
Missing values (in %)	41.9		32.1	
Five-year survival rate	41.9	53.4	41.2	53.6
Missing values (in %)	56.2		46.2	
Overall survival rate	68.8	74.3	61.7	72.6
Missing values (in %)	8.6		2.6	
Employment growth	0.074 (0.321)	0.085 (0.170)	0.069 (0.311)	0.066 (0.198)
Missing values (in %)	45.9		45.8	
Time of observation	1.384 (534)	1.496 (498)	1.364 (507)	1.386 (471)
Missing values (in %)	12.0		4.1	
Selection	54.5	45.5	45.0	54.7

Notes: (i) Regional sample of the ZFPS, (ii) shares of discrete variables in %, (iii) standard deviations of continuos variables in parentheses.

Regarding the mortality status without the distinction of certain periods of time[117], it can be seen from Table 19 that 74.3% of the subsidised firms in West Germany survive the whole period of observation. The share of surviving non-subsidised start-ups is lower with 68.8%. For East Germany these rates are lower, particularly for non-subsidised businesses. 61.7% of those survive the period during which they are observed. Among the subsidised start-ups in East Germany, 72.6% survive.

The second measure of firm success is the employment growth rate on a yearly basis, defined as the difference of the logarithms of the last and first statement on the firm's employment situation divided by the period of time between these two

[117] This measure indicates the share of start-ups, for which an employment growth rate can be calculated, in the speech of the "survivor bias".

statements (see Section 8.1.3). As shown in Section 8.1.3, this employment growth rate can only be derived for firms which are observed at least twice and which have survived the whole period of observation. Hence, besides the "survivor bias", a second possible bias may occur. It cannot be ruled out that the number of investigations a firm faces depends on the economic development of the firm. An objective followed by the VVC is, to present information on the credit worthiness and payment behaviour of firms to their customers. Therefore, the VVC investigates a company more frequently, if there is an inquiry by some other institution, e.g., a supplier, a customer or a credit institution. Indeed, the frequency of such investigations depends heavily on the economic situation of the firm. On the one hand investigations will take place if the firm is thought to be unable to pay outstanding debts or loans. On the other hand, investigations will take place more frequently if the firm is active and gets in contact with suppliers, customers and credit institutions. Whereas the former explanation hints at the poor development of the firm, the latter may indicate the opposite. Therefore, it is difficult to determine, in which direction this selection process will influence employment growth (for more details see Harhoff et al., 1998).

Figure 21: Year Specific Survival Rates for West Germany

Notes: (i) Regional sample of the ZFPS, (ii) own calculations (iii) survival rates in %.

In West Germany, a growth rate is available for 45.5% of the subsidised start-ups. For those firms not subsidised, this share is 9 percentage points higher. For the East German states this relationship is reversed. 54.7% of the subsidised and 45% of the non-subsidised firms have valid information on employment growth.

In the western part of Germany, the average employment growth rate is 8.5% for the subsidised and 7.4% for the non subsidised start-ups. Hence, the annual growth rate is just about half of that in a former study on the impacts of bridging

allowance (see Pfeiffer and Reize, 2000b). As the period of observation with 1,384 days for the non subsidised and 1,496 days for the subsidised firms is between two to three times higher than that of the former analysis, the average growth rate seems to decrease as the firm ages. From other studies (e.g. Harhoff et al., 1998 or Almus et al., 1999), it is known that young firms reach their maximum annual growth rate within the first two years after establishment. In the eastern part of Germany, the growth rate for subsidised start-ups is 6.9% and for non-subsidised start-ups 6.6%. The period of observation is somewhat shorter than for the western parts of Germany. Subsidised firms are observed for 1,386 and non-subsidised for 1,364 days on average.

Figure 22: Year Specific Survival Rates for East Germany

Notes: (i) Regional sample of the ZFPS, (ii) own calculations, (iii) survival rates in %.

8.3 Econometric Results

8.3.1 Start-Ups by the Unemployed

First, the results of the equation determining the type of firm are discussed in the context of a probit analysis.[118] The probability of belonging to the group of start-

[118] For the sake of clarity, the subsidisation equation (8.6) is estimated as a single equation using a probit model. The differences from the results of a joint estimation with the various success variables are minor. The estimates of the subsidisation equation for the different survival models are displayed in Appendix A.4 through Table 51 to Table 60 and for the growth models through Table 32 and Table 33.

ups subsidised on the basis of bridging allowance differs between the western and eastern regions of Germany (see Table 20 and Table 21).[119] The model is slightly better suited to explain subsidisation in the West with a Pseudo R-squared of 0.093 as compared to the east sample with a Pseudo R-squared of 0.074. Since the number of observations for both regions differ only slightly from one another, the result points to a greater similarity between the enterprises in the East German regions.

Probably some start-ups which were categorised as non-subsidised in this study have received other kinds of promotion. This might be one factor explaining the greater similarity between the two groups in the east sample since considerable amounts of firm subsidies have flowed to East Germany. Unfortunately, no information regarding this point can be found in the data. However, government subsidies from different sources can be cumulated in Germany so that some subsidised and some non-subsidised firms in fact should also have received money from other programmes.[120]

In the old German federal states, the unemployment to vacancy ratio leads to a significantly[121] higher percentage of subsidised start-ups by the unemployed. However, in the new German federal states the measure of regional labour market tightness has a negative effect on the probability of subsidised firm foundation.[122] A possible explanation for this unexpected result might be stronger competition between bridging allowance and other active labour market programmes for the unemployed in East Germany, like e.g. vocational training or re-education (see Lechner, 1999). Thus, the unemployed is pushed into e.g. a public works programme instead of into self-employment. A further explanation for the negative impact of the U/V-ratio might be migration. The poor perspectives in the East for a successful development of start-ups, may push part of the unemployed to the West German states instead of into self-employment.

In both parts of Germany, subsidised start-ups are significantly younger than their non-subsidised counterparts. In the context of this analysis, the age of the firm has no specific interpretation, but it serves as an important factor to control for unobserved heterogeneity between the two types of start-ups. All exogenous variables are defined at the point of time the firm is first observed. Therefore, the age of the firm controls, e.g., for unknown endowments with financial capital or the number of customers.

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[119] The Tables display the coefficient, standard error and mean as well as the marginal effect, which is calculated at the mean of the exogenous variables.

[120] Start-ups are promoted in Germany by over 100 programmes and many more local initiatives. See also Footnote 23.

[121] In the following, (weakly) significantly different from zero refers to a (10%) 5% level of significance.

[122] A variety of estimations with other measures of labour market tightness which were used in earlier drafts of the study did not yield different results. If, e.g., the unemployment ratio is used instead of the unemployment to vacancy ratio, the results are not affected (see Pfeiffer and Reize, 2000b).

Subsidised start-ups in West Germany as well as in East Germany are smaller than non-subsidised firms. In West Germany, one additional employee reduces the probability of observing a subsidised start-up by 0.3%. In the new federal states this marginal effect is -0.7%.

Table 20: Start-Ups by the Unemployed in West Germany

Variables	Coeffi-cient	Standard Error	Marginal effect	Mean
U/V-ratio	0.020	0.007	0.001	3.730
Age of firm at first observation/100	-0.029	0.013	-0.002	2.109
Initial firm size	-0.054	0.016	-0.003	2.782
Non-corporate firm	0.401	0.128	0.036	0.086
Trade enterprise/sole proprietorship	0.407	0.149	0.024	0.622
Manufacturing	0.129	0.117	0.009	0.102
Wholesale trade	-0.199	0.142	-0.011	0.075
Retail trade	-0.169	0.102	-0.010	0.255
Hospitality	-0.388	0.139	-0.019	0.111
Communication/transportation	-0.347	0.183	-0.017	0.051
Finance/insurance/real estates/housing	-0.293	0.172	-0.015	0.063
Data processing	0.218	0.158	0.017	0.034
Business related services	0.047	0.135	0.003	0.071
Other services	-0.403	0.157	-0.019	0.092
Derivative	0.526	0.347	0.055	0.005
Quarter 93/4	-0.789	0.149	-0.030	0.203
Quarter 94/1	-0.289	0.119	-0.015	0.043
Quarter 94/2	-0.410	0.112	-0.021	0.019
Quarter 94/3	-0.495	0.146	-0.022	0.122
Quarter 95/1	-0.028	0.100	-0.002	0.108
Quarter 95/2	-0.506	0.125	-0.023	0.171
Quarter 95/3	-1.061	0.202	-0.034	0.075
One additional shareholder	0.297	0.166	0.023	0.154
Two additional shareholders	0.570	0.199	0.060	0.128
Three and more additional shareholders	0.929	0.243	0.132	0.102
Constant	-1.603	0.166		
Log-likelihood		-835.906		
Full sample observations		5,300		
Wald test		$\chi^2(25) = 144.840$		
Pseudo R-squared		0.093		

Notes: (i) Maximum likelihood estimation of the probit model on the basis of a regional sample of the ZFPS. (ii) Reference categories for dummy variables are: corporate firm, construction, quarter 94/4, no additional shareholders. (iii) Robust standard errors using Huber/White/Sandwich estimator of variance covariance matrix.

Table 21: Start-Ups by the Unemployed in East Germany

Variables	Coeffi-cient	Standard Error	Marginal effect	Mean
U/V-ratio	-0.018	0.010	-0.002	3.333
Age of firm at first observation/100	-0.017	0.010	-0.002	3.110
Initial firm size	-0.054	0.011	-0.007	3.300
Non-corporate firm	0.149	0.113	0.020	0.113
Trade enterprise/sole proprietorship	0.265	0.131	0.031	0.715
Manufacturing	0.093	0.107	0.012	0.080
Wholesale trade	0.141	0.108	0.019	0.074
Retail trade	0.079	0.080	0.010	0.218
Hospitality	-0.178	0.116	-0.020	0.088
Communication/transportation	0.010	0.126	0.001	0.056
Finance/insurance/real estates/housing	-0.208	0.119	-0.023	0.079
Business rel. services incl. data processing	0.050	0.109	0.006	0.079
Other services	-0.163	0.113	-0.018	0.093
Derivative	-0.347	0.294	-0.034	0.016
One additional shareholder	0.473	0.153	0.075	0.162
Two additional shareholders	0.670	0.183	0.130	0.034
Three and more additional shareholders	0.548	0.311	0.101	0.009
Quarter 93/4	-0.578	0.120	-0.052	0.110
Quarter 94/1	-0.421	0.097	-0.042	0.150
Quarter 94/2	-0.562	0.099	-0.053	0.162
Quarter 94/3	-0.335	0.099	-0.035	0.117
Quarter 95/1	-0.101	0.087	-0.012	0.142
Quarter 95/2	-0.599	0.099	-0.055	0.144
Quarter 95/3	-1.404	0.222	-0.073	0.060
Constant	-1.088	0.154		
Log-likelihood		-1,327.286		
Full sample observations		5,084		
Wald test		$\chi^2(24) = 183.200$		
Pseudo R-squared		0.074		

Notes: (i) Maximum likelihood estimation of the probit model on the basis of a regional sample of the ZFPS. (ii) Reference categories for dummy variables are: corporate firm, construction, quarter 94/4, no additional shareholders. (iii) Robust standard errors using Huber/White/Sandwich estimator of variance covariance matrix.

In West Germany firms founded by the unemployed are 3.6% more likely to be started as non-corporate firms and 2.4% more likely to be started as trade enterprises as compared to being started as corporations. For the eastern parts of Germany, only trade enterprises are more likely to be found among the subsidised start-ups.

In the old German federal states, subsidised start-ups can be found with a lower probability in the areas of hospitality, communication/transportation and other

services as compared to the construction sector. However, in the data processing industry, subsidised start-ups are more likely to be established with a marginal effect of 1.7%. In the new German federal states, hardly any sector-related differences can be observed, apart from a weakly significant lower probability of subsidised firms being started in the Finance/insurance/real estates/housing sector as compared to the construction sector.

There are no significant differences in the type of start-up between subsidised and non-subsidised firms in both West and East Germany. However, in West Germany subsidised firms tend to be derivative foundations compared to non-subsidised ones.[123]

Both in the old and in the new German federal states, subsidised start-ups tend to involve several shareholders, which could indicate the significance of social networks for firm foundation by the unemployed. Especially in West Germany, the probability of observing a subsidised start-up is increased with the number of additional shareholders. Three or more shareholders increases this probability by 13.2% compared to an enterprise without additional shareholders.

In both regions, subsidised start-ups were established significantly more often in the fourth quarter of 1994 and in the first quarter of 1995. This suggests that the extension of the grants provided by bridging allowance indeed led to a considerable increase in the number of subsidised companies.

8.3.2 Firm Survival

In East and West Germany, the determinants of the probability of firm survival (see Table 22 to Table 26 for East Germany and Table 27 to Table 31 for West Germany) differ to a lesser extent than the coefficients explaining the heterogeneity between subsidised and non-subsidised firms.[124] In the new German federal states, the error terms of the survival and bridging allowance equations are correlated with a value of 0.732 for one year of survival and 0.552 for four years of survival. The high and positive correlation points to the existence of variables not taken into account and which favour the receipt of bridging allowance as well as the survival chances of the firm. One important unobserved factor is probably

[123] Estimations of the four-year survival probability and the employment growth rate yield a significant and positive effect on the probability that a derivative start-up will be subsidised (see next Section and Table 59 in the Appendix A.4).

[124] Table 22 to Table 31 display only the coefficients, standard errors, marginal effects and means for the survival equation, whereas the marginal effects are calculated in accordance with equation (8.10), (8.11) and (8.12), respectively. The corresponding subsidisation equations are reported in the Appendix A.4 in Table 51 to Table 60. If not otherwise stated, the results described in this section are based on the bivariate probit model of Section 8.1.2. For the sake of consistency and efficiency only variables which proved to be significantly different from zero on the 10% level on the basis of a Wald test are included. Further results of estimations, of the overall survival probability, i.e. survival without restriction to a certain period, can be found in the Appendix A.4 in Table 62 and Table 63.

motivation, which might be particularly important in East Germany after unification. Better information on human capital and on work history, such as the duration or frequency of unemployment spells would certainly be helpful for improving estimates in this respect. For the remaining models of two, three and five years of survival, the correlation coefficient is also positive in general, but not significantly different from zero.

In the old German federal states, the correlation turns out to be a negative value for most of the models, but does not differ significantly from zero. The only exception is the model for five years of survival. There, the correlation between the error terms is -0.677. Such a negative correlation may be a result of unobserved human capital variables, insofar as that previously unemployed firm founders are less educated than previously employed ones and a higher endowment of human capital improves the survival chances of a start-up. However, any conclusions drawn in this particular context can only be speculative in nature.

Both, in the old and in the new German federal states, bridging allowance has in general, with otherwise equal observable characteristics, no significant effect on the survival probability. There are three exceptions to this state of affair. In the first year after foundation, bridging allowance reduces the survival probability of start-ups in the new federal states. At least for this model, the simultaneous approach seems preferable since the subsidisation effect in the univariate probit model (without taking into account the correlation) is not significantly different from zero (see Table 61 in the Appendix). The corresponding marginal effect, conditional on the firm is being subsidised, is -0.5%. The two remaining exceptions are positive and significant effects of bridging allowance on the probability of three-year and five-year firm survival in West Germany.

The negative result for the one-year survival period in the eastern states requires some explanation. Being a member of the group of East German subsidised firms in the ZFSP reduces the survival chances during the first year after foundation after controlling for observable and unobservable characteristics. In other words, if they had not received bridging allowance, the same firms would have had a higher probability of surviving the first year. To participate in the scheme of bridging allowance therefore seems to be a bad choice for rational firm founders whose objectives are to establish a company which survives as long as possible.

Did firm founders in East Germany have this objective? That is not certain. One interpretation could be that the primary aim of East German unemployed firm founders was not firm foundation, but receiving bridging allowance. In Section 8.2.4 it was shown that 81% of firm closures were voluntary in nature, which seems to support this interpretation. Another interpretation is that the unemployed may have chosen bridging allowance in a rather myopic way.[125] After six months, when the payments from bridging allowance stop, plans have been revised and the firms have been closed because of changing expectations of costs and revenues and/or because of finding a better paying job as a dependent employee. Although,

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[125] See Lechner and Pfeiffer (1993) and Pfeiffer (1999) for more detailed studies on the determinants of self-employment and the search for self-employment after unification.

there might be such myopic or opportunistic behaviour, the extent of this phenomenon seems to be small, as shown by the marginal effect. Furthermore, it should be closely noted that only 2.2% (!) of the subsidised firms in East Germany do not survive the first year.

The negative effect during the first year is also mitigated by the long-term effects. With respect to the period between two and five years of survival, start-ups funded by subsidisation for the unemployed do not fare significantly worse than non-subsidised start-ups. On the contrary, except for the fourth year, the coefficient of bridging allowance is positive but not significantly different form zero.

Hence, opportunistic behaviour may coincide with bridging allowance in the new federal states, but only to a minor extent. Moreover, between the second and the fifth year after foundation firms subsidised through bridging allowance have the same survival chances as non-subsidised start-ups. Therefore, businesses started by previously unemployed people seem to be able to survive competition with other firms in the long run. On this basis, it appears to be the case that bridging allowance serves its purpose by providing for conditions of stable employment for the previously unemployed.

In West Germany we find a similar structure for the impact of bridging allowance on firm survival. Firms being subsidised have a lower but insignificantly different survival probability during the first year. In the following years, the survival probability is improved by bridging allowance. This effect is, however, only significantly different from zero for firms surviving at least three or five years, respectively. However, both effects cannot be regarded as robust. The inclusion of the insignificant variable "age of firm at first observation" in the selection equation results in a positive but insignificant effect of bridging allowance (see Table 64 in the Appendix). Furthermore, the strong impact of bridging allowance on the probability of surviving at least five years, with a marginal effect of 57.9%, seems to be very high compared to the effects in the other models. It is possible that the heavy reduction of the sample size for this period of observation influences the impact of bridging allowance on firm survival. The estimation is based on only 88 subsidised firms. Therefore, this estimate has to be taken with caution.

Apart from the problematic robustness of these two effects, it may be noted that firms started by unemployed people have at least the same survival chances as firms started by previously employed persons. The possible exception form this state of affairs emerges from the one-year survival probability, where the marginal effect of bridging allowance is -0.8%. It should be emphasised, however that this effect is calculated on the basis of an insignificant coefficient.

Therefore, we may conclude that the influence of bridging allowance on firm survival tends to be positive. However, on the basis of our results, opportunistic behaviour cannot be precluded. Particularly in East Germany, there is evidence that the focus of some unemployed was not successful firm foundation, but receiving bridging allowance and therefore extending their entitlement to unemployment benefits by a half year. This negative effect for the first year might be small, but one should keep in mind that the group of companies formed by the unemployed and contained in the ZFSP probably does not represent a random selection from the group of all enterprises subsidised through bridging allowance. It

can be assumed that this group is a rather active and successful one. Therefore, in this study the negative effect of bridging allowance on firm survival for the first year could be underestimated.

During a period of five years, bridging allowance seems to fulfil the aim of re-employing previously unemployed people. Though, bridging allowance cannot improve the survival probability of start-ups, the development of firms founded by the unemployed is not worse when compared to the development of firms founded by previously employed individuals. Questions about the effectiveness and efficiency of bridging allowance in Germany concern the opportunistic behaviour of recipients in the first year. Therefore, the political authorities might consider a reduction of the chances of extending unemployment benefits through the claims of bridging allowance. A possible solution would be a monitoring system which requires not only a business plan prior to the foundation of a firm but also a report of the economic activities of the firm during the period after its foundation. In case a company was not active, bridging allowance is converted into unemployment benefits with an appropriate reduction of the entitlement period.

The remaining results shall be briefly summarised. The size of a company, measured by its initial number of employees, has in general a positive influence on its survival probability, a finding which agrees with other studies on firm survival, e.g., Brüderl et al. (1996). However, the influence of firm size on survival probability is not linear. For West Germany a polynomial of third or fourth degree fits the data best. The employment-survival-profile of all models shares two distinctive characteristics. We first find a local maximum for survival probability between 5 and 10 employees. Afterwards, the survival rate decreases, until firm size reaches 19 to 23 employees. At this point, survival probability rises with growing firm size (see Figure 23). For the eastern states, these profiles are less clear. For most of the models, employment size squared or to the power of three fits best. However, the probability of surviving at least three years is not affected by the initial firm size. If there is a local minimum for survival probability, it is smaller than that of the western regions. Those firms which survive at least two years have their lowest survival probability at a firm size of 15, and those surviving five years at a size of 10 employees (see Figure 24).

The graph for five-year survival probability indicates a maximum of 34 employees. It seems to be unlikely that firms larger than 34 employees have lower survival probabilities. A possible explanation for that might be the fact that only 0.35% of the sample firms employ more than 34 individuals.

Summarising these findings, we find a higher survival probability for larger firms, with one exception for the West German states. There, the survival probability for very small firms with less than 10 employees is higher than for firms with 15 to 25 employees. Thus, the liability of smallness does not hold true for the whole range of firm size categories in this study.

The hypothesis of a higher mortality for corporations as compared to non-corporate firms also does not hold true. For corporations, close-downs as a form of market exit play a less important role. This finding may be the result of the sample construction. The sample contained mainly voluntary shut-downs as opposed to insolvencies. In general, sole proprietorships show the highest mortality rates

among the different legal forms, which is not surprising since sole proprietorships or trade enterprises can be easily founded, i.e., with minor bureaucratic effort, and can likewise easily be closed.

Figure 23: Estimated Survival Probability Conditional on Being Subsidised in West Germany

Notes: (i) Simulation is based on the estimates of Table 27 to Table 31. (ii) Simulation for sample means of continuous and reference categories of discrete variables.

In the hospitality sector, firms in the old federal states reveal the lowest survival probability relative to the construction sector. Foundations in business related services have a low probability of surviving the first year, whereas start-ups in communication and transportation are less likely to survive at least four years as compared to start-ups in construction. High survival rates are found in manufacturing and other services and to a lesser extent for retail trade and finance/insurance/real estates/housing sectors. In the new German federal states, the results are similar. Start-ups in hospitality have low while firms in manufacturing and other services have high survival probabilities. Moreover, compared to construction, start-ups in finance/insurance/real estates/housing as well as in business related services have good chances to survive the first years after foundation.

In West Germany, the human capital variable, age of the most important person involved in the start-up, only has a significant influence on the probability of surviving at least three and four years, respectively. In both models the influence is non-linear with the lowest survival probability in the age group of founders younger than 25 years. The peak of survival probability is reached in the interval between 40 and 45 years in both models as well as in the interval of 55 years and older in the four-year survival model. In the East German regions, an interpreta-

tion of the influence of age on firm survival is difficult since, due to a high number of missing values the category of "age is missing" is included.

Figure 24: Estimated Survival Probability Conditional on Being Subsidised in East Germany

Notes: (i) Simulation is based on the estimates of Table 22 to Table 26. (ii) Simulation for sample means of continuous and reference categories of discrete variables.

Nevertheless, very young founders aged under 25 seem to reduce the probability of firm survival. Again, the highest survival rates are found in the age groups between 40 and 55 years. For sure, the interpretation of this result is limited since for firms for which the age of the founder is unknown, higher survival rates are found. Nevertheless, there seems to be a positive relationship between human capital of the founder and the survival probability of the firm. Start-ups founded by women have a lower survival probability than those founded by men.

Independent of the region, organisational factors have little influence on the survival probability of start-ups. Whereas networks reduce the survival probability in all models, except for the probability of surviving the first year in West Germany, diversification reduces just the probability of one- and two-year survival in the East. The type of start-up, derivative or original, does not influence firm survival in any way.

In West Germany, the highest survival probabilities are throughout found in the labour market districts of Hof/Bayreuth. In the eastern regions, the labour market district of Dessau has the highest survival rates.

Start-ups founded in 1993 have a higher probability of surviving at least five years in the East and of surviving at least three, four and five years, respectively, in the West. In contrast, the cohort from 1995 has the lowest survival chances in the models of three-, four- and five-years of firm survival.

Table 22: One-Year Firm Survival in East Germany

	Coefficient	Standard Error	Marginal Effect	Mean
Survival equation				
Bridging allowance	-1.473	0.716	-0.0048913	0.078
Initial firm size/10	-0.356	0.142	-0.0000074	0.343
Initial firm size squared/10	0.071	0.037	0.0000015	0.366
Non-corporate firm	-0.554	0.148	-0.0001235	0.117
Trade enterprise/sole proprietorship	-0.678	0.132	-0.0000153	0.702
Manufacturing	-0.136	0.129	-0.0000071	0.084
Wholesale trade	-0.262	0.131	-0.0000249	0.070
Retail trade	0.018	0.106	0.0000002	0.214
Hospitality	0.003	0.139	0.0000021	0.084
Communication/transportation	-0.076	0.155	-0.0000008	0.057
Finance/insurance/real estates/housing	0.326	0.184	0.0000039	0.076
Business related services	0.056	0.145	0.0000009	0.081
Other services	0.217	0.156	0.0000036	0.091
Schwerin	0.194	0.101	0.0000035	0.344
Berlin (East)	0.032	0.127	0.0000006	0.102
Pirna	0.213	0.119	0.0000031	0.189
Dessau	0.372	0.117	0.0000048	0.211
Diversified	-0.172	0.091	-0.0000054	0.161
Networks	-0.249	0.085	-0.0000086	0.239
25 ≤age < 30	0.208	0.151	0.0000027	0.110
30 ≤age < 35	0.056	0.145	0.0000010	0.129
35 ≤age < 40	0.112	0.153	0.0000018	0.116
40 ≤age < 45	0.169	0.154	0.0000024	0.109
45 ≤age < 50	0.376	0.205	0.0000034	0.066
50 ≤age < 55	-0.006	0.174	-0.0000001	0.056
55 ≤age < 84	0.144	0.226	0.0000020	0.028
Information on age is missing	0.390	0.139	0.0000066	0.321
Constant	2.186	0.217		
Correlation	0.732	0.206		
Log likelihood		-1,847.498		
Full sample observations		4,566		
Wald test		$\chi^2(50)=298.15$		

Notes: (i) FIML estimation of the bivariate probit model, based on a regional sample of the ZFPS. (ii) Reference categories for dummy variables are: corporate firm, construction, other region, age < 25. (iii) Robust standard errors using Huber/White/Sandwich estimator of variance covariance matrix.

Table 23: Two-Year Firm Survival in East Germany

	Coefficient	Standard Error	Marginal Effect	Mean
Survival equation				
Bridging allowance	0.090	0.833	0.011	0.078
Initial firm size/10	-0.424	0.143	-0.058	0.353
Initial firm size/10 squared	0.123	0.050	0.017	0.380
Non-corporate firm	-0.366	0.105	-0.061	0.117
Trade enterprise/sole proprietorship	-0.510	0.085	-0.060	0.694
Manufacturing	0.086	0.103	0.011	0.084
Wholesale trade	-0.111	0.106	-0.019	0.069
Retail trade	0.140	0.080	0.017	0.213
Hospitality	-0.080	0.100	-0.007	0.085
Communication/transportation	-0.114	0.110	-0.015	0.058
Finance/insurance/real estates/housing	0.332	0.128	0.040	0.072
Business rel. serv. incl. data processing	0.288	0.118	0.032	0.077
Other services	0.292	0.111	0.035	0.089
Schwerin	0.298	0.076	0.038	0.352
Berlin (East)	0.155	0.100	0.019	0.098
Pirna	0.185	0.086	0.023	0.188
Dessau	0.484	0.087	0.054	0.208
Diversified	-0.127	0.070	-0.018	0.163
Networks	-0.212	0.063	-0.031	0.246
Female	-0.082	0.065	-0.012	0.207
25 ≤age < 30	0.128	0.116	0.016	0.111
30 ≤age < 35	0.131	0.113	0.017	0.131
35 ≤age < 40	0.164	0.118	0.020	0.116
40 ≤age < 45	0.324	0.121	0.036	0.111
45 ≤age < 50	0.249	0.136	0.029	0.065
50 ≤age < 55	0.397	0.151	0.041	0.056
55 ≤age < 84	0.081	0.170	0.010	0.028
Information on age is missing	0.316	0.103	0.040	0.317
Start-up cohort of 1993	0.126	0.090	0.016	0.113
Start-up cohort of 1995	-0.079	0.054	-0.011	0.340
Constant	1.245	0.173		
Correlation	0.122	0.409		
Log likelihood		-2,566.886		
Full sample of observations		4,237		
Wald test		$\chi^2(49)=312.66$		

Notes: (i) FIML estimation of the bivariate probit model, based on a regional sample of the ZFPS. (ii) Reference categories for dummy variables are: corporate firm, construction, other region, age < 25, cohort of 1994. (iii) Robust standard errors using Huber/White/ Sandwich estimator of variance covariance matrix.

Table 24: Three-Year Firm Survival in East Germany

	Coeffi-cient	Standard Error	Marginal Effect	Mean
Survival equation				
Bridging allowance	0.315	0.638	0.08454	0.078
Non-corporate firm	-0.203	0.091	-0.06418	0.119
Trade enterprise/sole proprietorship	-0.253	0.066	-0.07287	0.685
Manufacturing	0.175	0.090	0.04935	0.087
Wholesale trade	-0.112	0.096	-0.03491	0.069
Retail trade	0.062	0.069	0.01832	0.211
Hospitality	-0.208	0.089	-0.06610	0.083
Communication/transportation	0.092	0.102	0.02686	0.059
Finance/insurance/real estates/housing	0.349	0.106	0.09244	0.069
Business rel. serv. incl. data processing	0.285	0.100	0.07730	0.073
Other services	0.330	0.094	0.08833	0.088
Schwerin	0.338	0.068	0.09738	0.356
Berlin (East)	0.214	0.091	0.05973	0.096
Pirna	0.227	0.075	0.06410	0.187
Dessau	0.460	0.076	0.12298	0.206
Networks	-0.202	0.055	-0.06268	0.252
Female	-0.122	0.058	-0.03761	0.201
$25 \leq age < 30$	0.151	0.104	0.04331	0.114
$30 \leq age < 35$	0.295	0.102	0.08078	0.131
$35 \leq age < 40$	0.317	0.106	0.08581	0.116
$40 \leq age < 45$	0.490	0.108	0.12465	0.111
$45 \leq age < 50$	0.377	0.120	0.09827	0.066
$50 \leq age < 55$	0.486	0.132	0.12057	0.055
$55 \leq age < 84$	0.248	0.154	0.06757	0.028
Information on age is missing	0.401	0.092	0.11287	0.315
Start-up cohort of 1993	0.115	0.079	0.03329	0.114
Start-up cohort of 1995	-0.146	0.048	-0.04446	0.342
Constant	0.344	0.133		
Correlation	0.003	0.331		
Log likelihood		-3,059.244		
Full sample observations		3,954		
Wald test		$\chi^2(46)=331.56$		

Notes: (i) FIML estimation of the bivariate probit model, based on a regional sample of the ZFPS. (ii) Reference categories for dummy variables are: corporate firm, construction, other region, age < 25, cohort of 1994. (iii) Robust standard errors using Huber/White/ Sandwich estimator of variance covariance matrix.

Table 25: Four-Year Firm Survival in East Germany

	Coeffi-cient	Standard Error	Marginal Effect	Mean
Survival equation				
Bridging allowance	-0.789	0.599	-0.165	0.079
Initial firm size	-0.223	0.158	-0.026	0.369
Initial firm size squared	0.145	0.086	0.017	0.406
Initial firm size to the power of three	-0.020	0.010	-0.002	0.993
Non-corporate firm	-0.211	0.086	-0.028	0.118
Trade enterprise/sole proprietorship	-0.285	0.064	-0.030	0.681
Manufacturing	0.256	0.088	0.019	0.086
Wholesale trade	-0.049	0.093	-0.019	0.071
Retail trade	0.024	0.067	-0.001	0.211
Hospitality	-0.383	0.089	-0.032	0.082
Communication/transportation	-0.050	0.098	-0.007	0.058
Finance/insurance/real estates/housing	0.238	0.103	0.032	0.069
Business rel. serv. incl. data processing	0.180	0.095	0.014	0.070
Other services	0.216	0.090	0.026	0.085
Schwerin	0.350	0.068	0.037	0.356
Berlin (East)	0.150	0.088	0.015	0.094
Pirna	0.159	0.073	0.017	0.187
Dessau	0.569	0.078	0.048	0.207
Networks	-0.216	0.053	-0.028	0.259
Female	-0.177	0.055	-0.023	0.196
25 $\leq$age < 30	0.199	0.100	0.020	0.117
30 $\leq$age < 35	0.250	0.099	0.024	0.133
35 $\leq$age < 40	0.291	0.102	0.027	0.117
40 $\leq$age < 45	0.438	0.105	0.036	0.105
45 $\leq$age < 50	0.345	0.117	0.030	0.064
50 $\leq$age < 55	0.419	0.124	0.033	0.055
55 $\leq$age < 84	0.246	0.152	0.022	0.026
Information on age is missing	0.379	0.090	0.038	0.313
Start-up cohort of 1993	0.119	0.075	0.013	0.118
Start-up cohort of 1995	-0.206	0.049	-0.025	0.325
Constant	0.177	0.139		
Correlation	0.552	0.274		
Log likelihood		-3,097.893		
Full sample of observations		3,551		
Wald test		$\chi^2(50)=416.53$		

Notes: (i) FIML estimation of the bivariate probit model, based on a regional sample of the ZFPS. (ii) Reference categories for dummy variables are: corporate firm, construction, other region, age < 25, cohort of 1994. (iii) Robust standard errors using Huber/White/ Sandwich estimator of variance covariance matrix.

Table 26: Five-Year Firm Survival in East Germany

	Coefficient	Standard Error	Marginal Effect	Mean
Survival equation				
Bridging allowance	0.810	1.980	0.302	0.075
Initial firm size/10	-0.139	0.245	-0.044	0.377
Initial firm size/10 squared	0.170	0.104	0.053	0.438
Initial firm size/10 to the power of three	-0.025	0.011	-0.008	1.134
Non-corporate firm	-0.266	0.107	-0.077	0.119
Trade enterprise/sole proprietorship	-0.168	0.104	-0.054	0.681
Manufacturing	0.299	0.114	0.111	0.082
Wholesale trade	0.035	0.127	0.028	0.077
Retail trade	-0.049	0.079	-0.012	0.209
Hospitality	-0.435	0.139	-0.136	0.090
Communication/transportation	-0.027	0.113	-0.011	0.061
Finance/insurance/real estates/housing	0.185	0.142	0.030	0.068
Business rel. serv. incl. data processing	0.119	0.112	0.040	0.069
Other services	0.285	0.105	0.084	0.081
Schwerin	0.369	0.080	0.120	0.356
Berlin (East)	0.071	0.106	0.023	0.092
Pirna	0.130	0.086	0.042	0.189
Dessau	0.527	0.089	0.183	0.193
Networks	-0.206	0.062	-0.062	0.268
Female	-0.164	0.067	-0.049	0.197
$25 \leq age < 30$	0.081	0.121	0.026	0.117
$30 \leq age < 35$	0.112	0.119	0.036	0.133
$35 \leq age < 40$	0.213	0.122	0.071	0.120
$40 \leq age < 45$	0.381	0.123	0.132	0.108
$45 \leq age < 50$	0.241	0.141	0.081	0.064
$50 \leq age < 55$	0.359	0.139	0.125	0.060
$55 \leq age < 84$	0.184	0.187	0.062	0.026
Information on age is missing	0.285	0.107	0.093	0.299
Start-up cohort of 1993	0.281	0.090	0.094	0.141
Start-up cohort of 1995	-0.933	0.080	-0.242	0.266
Constant	-0.329	0.272		
Correlation	-0.248	1.036		
Log likelihood		-2,362.825		
Full sample of observations		2,801		
Wald test		$\chi^2(49)=586.33$		

Notes: (i) FIML estimation of the bivariate probit model, based on a regional sample of the ZFPS. (ii) Reference categories for dummy variables are: corporate firm, construction, other region, age < 25, cohort of 1994. (iii) Robust standard errors using Huber/White/Sandwich estimator of variance covariance matrix.

Table 27: One-Year Firm Survival in West Germany

	Coefficient	Standard Error	Marginal Effect	Mean
Survival equation				
Bridging allowance	-0.128	1.748	-0.008	0.044
Initial firm size/10	1.573	0.533	0.086	0.299
Initial firm size/10 squared	-1.964	0.668	-0.107	0.327
Initial firm size/10 to the power of three	0.683	0.257	0.037	1.101
Initial firm size/10 to the power of four	-0.056	0.022	-0.003	5.998
Non-corporate firm	-0.645	0.159	-0.068	0.084
Trade enterprise/sole proprietorship	-0.649	0.101	-0.036	0.581
Manufacturing	-0.016	0.132	-0.001	0.111
Wholesale trade	0.025	0.154	0.002	0.077
Retail trade	0.045	0.109	0.003	0.247
Hospitality	-0.391	0.125	-0.025	0.095
Communication/transportation	-0.148	0.157	-0.006	0.052
Finance/insurance/real estates/housing	-0.039	0.166	-0.0002	0.063
Data processing	-0.007	0.210	-0.002	0.034
Business related services	-0.237	0.140	-0.016	0.073
Other services	0.127	0.162	0.009	0.091
Bremen	0.033	0.128	0.002	0.110
Hannover	0.292	0.130	0.013	0.143
Kassel	0.323	0.148	0.014	0.093
Essen	0.155	0.149	0.007	0.080
Hof/Bayreuth	0.423	0.159	0.016	0.086
Bad Kreuznach/Mainz	-0.045	0.116	-0.003	0.155
Deggendorf/Landshut	0.057	0.131	0.003	0.113
Göppingen	0.123	0.131	0.006	0.127
Networks	-0.205	0.095	-0.013	0.127
Constant	1.828	0.176		
Correlation	0.122	0.806		
Log likelihood		-1,593.228		
Full sample observations		4,292		
Wald test		$\chi^2(49)=259.68$		

Notes: (i) FIML estimation of the bivariate probit model, based on a regional sample of the ZFPS. (ii) Reference categories for dummy variables are: corporate firm, construction, other region. (iii) Robust standard errors using Huber/White/Sandwich estimator of variance covariance matrix.

Table 28: Two-Year Firm Survival in West Germany

	Coeffi-cient	Standard Error	Marginal Effect	Mean
Survival equation				
Bridging allowance	0.467	0.744	0.099	0.042
Initial firm size/10	1.416	0.359	0.373	0.307
Initial firm size/10 squared	-1.343	0.369	-0.354	0.347
Initial firm size/10 to the power if three	0.310	0.093	0.082	1.178
Non-corporate firm	-0.444	0.115	-0.117	0.083
Trade enterprise/sole proprietorship	-0.563	0.068	-0.132	0.574
Manufacturing	0.208	0.108	0.055	0.112
Wholesale trade	-0.010	0.112	-0.006	0.077
Retail trade	0.151	0.083	0.034	0.246
Hospitality	-0.371	0.098	-0.123	0.094
Communication/transportation	-0.088	0.120	-0.037	0.053
Finance/insurance/real estates/housing	0.083	0.129	0.006	0.063
Data processing	0.206	0.163	0.056	0.034
Business related services	-0.063	0.113	-0.015	0.074
Other services	0.219	0.120	0.037	0.089
Bremen	0.288	0.105	0.068	0.110
Hannover	0.412	0.101	0.094	0.141
Kassel	0.234	0.110	0.056	0.092
Essen	0.324	0.118	0.075	0.079
Hof/Bayreuth	0.661	0.122	0.131	0.085
Bad Kreuznach/Mainz	0.279	0.096	0.067	0.156
Deggendorf/Landshut	0.366	0.107	0.084	0.114
Göppingen	0.364	0.105	0.084	0.131
Networks	-0.171	0.078	-0.048	0.128
Constant	0.889	0.138		
Correlation	-0.139	0.374		
Log likelihood		-2,189.259		
Full sample observations		4,010		
Wald test		$\chi^2(48)=339.54$		

Notes: (i) FIML estimation of the bivariate probit model, based on a regional sample of the ZFPS. (ii) Reference categories for dummy variables are: corporate firm, construction, other region. (iii) Robust standard errors using Huber/White/Sandwich estimator of variance covariance matrix.

Table 29: Three-Year Firm Survival in West Germany

	Coeffi-cient	Standard Error	Marginal Effect	Mean
Survival equation				
Bridging allowance	1.132	0.560	0.447	0.042
Initial firm size/10	1.324	0.345	0.560	0.312
Initial firm size/10 squared	-1.377	0.395	-0.583	0.359
Initial firm size/10 to the power if three	0.441	0.135	0.187	1.247
Initial firm size/10 to the power if four	-0.035	0.012	-0.015	6.883
Non-corporate firm	-0.293	0.105	-0.046	0.081
Trade enterprise/sole proprietorship	-0.450	0.060	-0.129	0.571
Manufacturing	0.159	0.096	0.078	0.114
Wholesale trade	0.027	0.101	-0.013	0.077
Retail trade	0.154	0.078	0.031	0.242
Hospitality	-0.438	0.096	-0.211	0.093
Communication/transportation	-0.145	0.113	-0.127	0.054
Finance/insurance/real estates/housing	0.228	0.121	0.010	0.062
Data processing	0.178	0.147	0.108	0.033
Business related services	-0.030	0.103	-0.006	0.075
Other services	0.359	0.110	0.032	0.089
Bremen	0.318	0.100	0.137	0.113
Hannover	0.398	0.094	0.172	0.142
Kassel	0.282	0.103	0.122	0.092
Essen	0.262	0.109	0.113	0.077
Hof/Bayreuth	0.662	0.112	0.283	0.084
Bad Kreuznach/Mainz	0.243	0.090	0.104	0.157
Deggendorf/Landshut	0.356	0.100	0.154	0.113
Göppingen	0.410	0.099	0.177	0.128
Networks	-0.240	0.070	-0.098	0.130
Female	-0.120	0.057	-0.050	0.224
Start-up cohort of 1993	0.151	0.078	0.065	0.126
Start-up cohort of 1995	-0.084	0.050	-0.035	0.363
Constant	0.462	0.131		
Correlation	-0.438	0.305		
Log likelihood		-2,473.341		
Full sample observations		3,709		
Wald test		$\chi^2(52)=432.14$		

Notes: (i) FIML estimation of the bivariate probit model, based on a regional sample of the ZFPS. (ii) Reference categories for dummy variables are: corporate firm, construction, other region, cohort of 1994. (iii) Robust standard errors using Huber/White/Sandwich estimator of variance covariance matrix.

Table 30: Four-Year Firm Survival in West Germany

	Coeffi-cient	Standard Error	Marginal Effect	Mean
Survival equation				
Bridging allowance	0.400	0.815	0.128	0.042
Initial firm size/10	1.161	0.305	0.413	0.321
Initial firm size/10 squared	-0.896	0.284	-0.319	0.385
Initial firm size/10 to the power if three	0.193	0.066	0.069	1.339
Non-corporate firm	-0.256	0.111	-0.097	0.079
Trade enterprise/sole proprietorship	-0.494	0.063	-0.172	0.570
Manufacturing	0.181	0.099	0.062	0.108
Wholesale trade	-0.058	0.108	-0.021	0.076
Retail trade	0.119	0.082	0.042	0.246
Hospitality	-0.530	0.099	-0.202	0.099
Communication/transportation	-0.220	0.118	-0.081	0.054
Finance/insurance/real estates/housing	0.044	0.117	0.015	0.064
Data processing	0.229	0.156	0.077	0.030
Business related services	-0.003	0.108	-0.001	0.076
Other services	0.233	0.109	0.079	0.086
Bremen	0.206	0.115	0.070	0.084
Hannover	0.478	0.100	0.154	0.160
Kassel	0.330	0.111	0.109	0.097
Essen	0.333	0.116	0.110	0.085
Hof/Bayreuth	0.852	0.120	0.238	0.083
Bad Kreuznach/Mainz	0.343	0.099	0.114	0.158
Deggendorf/Landshut	0.375	0.106	0.123	0.116
Göppingen	0.428	0.106	0.138	0.121
Networks	-0.191	0.073	-0.070	0.141
Female	-0.177	0.061	-0.064	0.217
25 ≤age < 30	0.282	0.106	0.096	0.188
30 ≤age < 35	0.323	0.104	0.109	0.226
35 ≤age < 40	0.327	0.108	0.110	0.178
40 ≤age < 45	0.433	0.114	0.140	0.130
45 ≤age < 50	0.171	0.121	0.059	0.099
50 ≤age < 55	0.293	0.138	0.097	0.057
55 ≤age < 84	0.353	0.142	0.115	0.053
Start-up cohort of 1993	0.155	0.078	0.054	0.138
Start-up cohort of 1995	-0.146	0.054	-0.053	0.343
Constant	-0.123	0.162		
Correlation	0.008	0.386		

Log likelihood	-2,270.413
Full sample observations	3,015
Wald test	$\chi^2(47)=389.38$

Notes: (i) FIML estimation of the bivariate probit model, based on a regional sample of the ZFPS. (ii) Reference categories for dummy variables are: corporate firm, construction, other region, age < 25, cohort of 1994. (iii) Robust standard errors using Huber/White/ Sandwich estimator of variance covariance matrix.

Table 31: Five-Year Firm Survival in West Germany

	Coeffi-cient	Standard Error	Marginal Effect	Mean
Survival equation				
Bridging allowance	1.907	0.308	0.579	0.039
Initial firm size/10	1.068	0.366	0.053	0.306
Initial firm size/10 squared	-0.837	0.360	-0.042	0.344
Initial firm size/10 to the power if three	0.181	0.085	0.009	1.143
Non-corporate firm	-0.401	0.112	-0.0004	0.079
Trade enterprise/sole proprietorship	-0.493	0.072	-0.020	0.593
Manufacturing	0.251	0.112	0.017	0.104
Wholesale trade	0.081	0.123	0.004	0.080
Retail trade	0.039	0.093	0.002	0.254
Hospitality	-0.621	0.119	-0.017	0.111
Communication/transportation	-0.218	0.143	-0.008	0.054
Finance/insurance/real estates/housing	-0.089	0.136	-0.004	0.061
Data processing	0.238	0.167	0.016	0.028
Business related services	0.050	0.123	0.003	0.076
Other services	0.165	0.123	0.010	0.080
Bremen	0.255	0.135	0.017	0.087
Hannover	0.423	0.119	0.032	0.162
Kassel	0.358	0.133	0.027	0.095
Essen	0.373	0.137	0.029	0.085
Hof/Bayreuth	0.955	0.135	0.142	0.083
Bad Kreuznach/Mainz	0.411	0.119	0.031	0.158
Deggendorf/Landshut	0.372	0.125	0.028	0.114
Göppingen	0.440	0.125	0.036	0.115
Networks	-0.191	0.082	-0.008	0.142
Female	-0.150	0.068	-0.007	0.231
$25 \leq age < 30$	0.317	0.125	0.021	0.201
$30 \leq age < 35$	0.351	0.125	0.024	0.218
$35 \leq age < 40$	0.313	0.130	0.021	0.171
$40 \leq age < 45$	0.452	0.134	0.037	0.130
$45 \leq age < 50$	0.193	0.143	0.012	0.101

50 ≤age < 55	0.359	0.163	0.028	0.056
55 ≤age < 84	0.452	0.166	0.040	0.051
Start-up cohort of 1993	0.282	0.077	0.019	0.167
Start-up cohort of 1995	-0.950	0.074	-0.031	0.259
Constant	-0.555	0.190		
Correlation	-0.677	0.134		
Log likelihood	-1,635.119			
Full sample observations	2,273			
Wald test	$\chi^2(44)=592.05$			

Notes: (i) FIML estimation of the bivariate probit model, based on a regional sample of the ZFPS. (ii) Reference categories for dummy variables are: corporate firm, construction, other region, age < 25. (iii) Robust standard errors using Huber/White/Sandwich estimator of variance covariance matrix.

8.3.3 Employment Growth

The estimation results for West Germany show only marginal differences between the FIML estimator and the two-step procedure (see Table 32).[126] It is not surprising that the coefficients are nearly identical, but the standard errors in the two-step model, which are not corrected, also have nearly the same values as the consistent and efficient errors obtained by FIML estimation.[127] However, upon a closer examination of the results, we find two major differences between the two models. First, the most interesting coefficient in the growth equation, namely bridging allowance, is negative and significant in the FIML model and negative but insignificant in the two-step model. Furthermore the coefficient in the two-step model is around 10% smaller than the coefficient obtained by FIML estimation. Consequently, bridging allowance reduces employment growth of newly founded firms by 13.3%. This result questions the efficiency of bridging allowance creating additional employment. If the same firm, with all observable characteristics equal, had not be subsidised with bridging allowance, it would have created more jobs.

The second major difference between the two estimators, which is closely related to the first one, is a merely weakly significant correlation between employment growth and subsidisation in the two-step model as compared to a significant

[126] Estimations in Table 32 and Table 33 only include coefficients, which are significantly different form zero on the 10% level, based on the Wald test for the FIML estimation and on the F test for the two-step model.

[127] It should be well noted that the standard errors of the two-step estimation are only inconsistent for the growth equation. Those errors in the first step (the bivariate selection equations) are also obtained using FIML estimation. Therefore, the standard errors of the selection equations can even be smaller for the two-step estimation as compared to the FIML estimation.

and positive correlation in the FIML model.[128] This result suggests a positive influence of unobservable characteristics on the probability of starting a firm with the support of bridging allowance as well as on employment growth. The two-step model underestimates this unobserved impact and therefore leads to an upwardly biased (from negative towards zero) estimate of bridging allowance. Though the estimates are still consistent in the two-step model, the inefficiency of this procedure may lead to mistaken conclusions. This is a serious problem, particularly for dummy endogenous models, as the most interesting parameter of these models, the endogenous dummy, is most affected by the inefficiency. In our case, the sole use of the two-step estimator would have led to the result that bridging allowance has no impact on firm growth, whereas bridging allowance in fact reduces growth by over 13%.

Similar results are obtained for East Germany (see Table 33). Again, almost all coefficients and standard errors are the same for both estimators, apart from the coefficient for bridging allowance and the correlation between subsidisation and growth. As for West Germany, the estimate of bridging allowance in the two step model is insignificant but slightly smaller than in the FIML model. In the eastern parts of Germany, bridging allowance reduces employment growth by 5.8%. Hence, bridging allowance failed to create additional employment, whereas it succeeded in reemploying the unemployed. The negative effect of bridging allowance in East Germany is about half as high as in West Germany, though it should be well noted that in the eastern regions, opportunistic behaviour is found to a larger extend than in the western regions (see the previous Section).

The consequences of this negative effect for the employment situation of the whole economy depend greatly on the displacement rate between subsided and non-subsidised start-ups. Thus, if there is a high rate of displacement, an extension of bridging allowance would probably lead to a reduced rate of employment at the macroeconomic level. The size of this replacement rate is difficult to quantify. But it seems likely that in certain sectors with low entry costs and low growth rates, at least a partial displacement of non-subsidised firms by subsidised start-ups occurs. Furthermore, it should be noted that around 20% of the newly founded firms are subsidised with bridging allowance (see Section 2.2.2). Even if the impact at the macroeconomic level might be small due to small sizes of the relevant start-ups, bridging allowance will at least lead to inefficient start-ups. Therefore, bridging allowance can hardly be regarded as an instrument to establish a new culture of entrepreneurship.

The remaining results can be briefly summarised. There is a negative correlation between growth and selection in West Germany as well as in East Germany. However, the coefficient for the East is not significantly different from zero. This result may be a hint that worse performing firms are more likely examined by the VVC and that this effect predominates the positive "survivor bias", at least in West Germany. The correlation between selection and subsidisation is also nega-

[128] Table 32 and Table 33 show the estimated coefficients of the inverses of Mill's ratio ($\sigma_{\varepsilon u}$ and $\sigma_{\varepsilon v}$) for the two-step model, instead of $\rho_{\varepsilon u}$ and $\rho_{\varepsilon v}$. For the definition of the correlation coefficients, see Section 8.1.3.

tive for both regions. Again, there is considerable room for speculation about unobservable factors that may influence selection and subsidisation in opposite ways.

In both parts of Germany, we find evidence contradicting Gibrat's Law that firm growth is proportional to firm size. The growth-employment-profile is convex for both regions. In West Germany, the employment growth rate declines until an initial firm size of 47 employees is reached and then increases again. For the eastern states, the minimum of employment growth is found at 27 employees.

In the West German regions, corporations grow up to 6.8% faster than noncorporate firms or sole proprietorships. In the East German regions, this effect amounts up to 4.3%. In accordance with this result, the hypothesis that corporations have greater growth potential if they survive cannot be refuted.

In both parts of Germany, the construction sector has the highest growth rate. Start-ups in this sector grow 8.7% faster than start-ups in finance/insurance/real estates/housing, 6.2% faster than start-ups in retail trade and 4.3% faster than start-ups in business related services in West Germany. In East Germany, as well, companies in finance/insurance/real estates/housing grow slowest (12.1% slower than construction firms). Similar to the West, low growth rates are found in retail trade, business related services and other services, respectively.

Organisational factors have no impact on firm growth in the old federal states. In the new states, start-ups within networks seem to grow faster by 4%. Finally, personal characteristics influence firm growth neither in the West nor in the East.

Since the coefficients of the selection equation are difficult to interpret because of two competing selection processes (firm survival and firm examination, see Section 8.1.3), only the effects of bridging allowance, payment history and credit worthiness will be discussed.[129] Subsidised firms are more likely to have valid information on growth rates in East and West Germany. In West Germany, an employment growth rate can be calculated more often for firms which pay their bills within 30 days and for whom credit is advisable. In the eastern regions, this is the case for firms paying without delay and for whom credits are advisable or possible. In both parts of Germany, the categories of no experience with respect to payment behaviour, payments are overdue and no credit experience reduce the probability of being selected for employment growth estimation.

[129] For the discussion of the subsidisation equation, see Section 8.3.1.

Table 32: Firm Growth in West Germany

	FIML estimation		Two-step estimation	
	Coeffi-cient	Standard Error	Coeffi-cient	Standard Error
Growth equation				
Bridging allowance	-0.133	0.039	-0.117	0.076
Initial firm size	-0.178	0.028	-0.178	0.028
Initial firm size squared	0.019	0.007	0.019	0.007
Non-corporate firm	-0.068	0.015	-0.068	0.015
Trade enterprise/sole proprietorship	-0.048	0.013	-0.048	0.013
Manufacturing	-0.019	0.019	-0.019	0.019
Wholesale trade	-0.031	0.017	-0.030	0.017
Retail trade	-0.062	0.015	-0.062	0.015
Hospitality	-0.031	0.018	-0.029	0.018
Communication/transportation	-0.005	0.019	-0.004	0.019
Finance/insurance/real estates/housing	-0.087	0.024	-0.086	0.023
Data processing	-0.035	0.023	-0.036	0.023
Business related services	-0.043	0.020	-0.042	0.021
Other services	-0.046	0.025	-0.044	0.026
Constant	0.221	0.034	0.224	0.034
Subsidisation equation				
U/V-ratio	0.019	0.008	0.018	0.008
Age of firm at first observation/100	-0.087	0.015	-0.084	0.015
Initial firm size	-0.047	0.012	-0.051	0.014
Non-corporate firm	0.296	0.128	0.304	0.129
Trade enterprise/sole proprietorship	0.210	0.153	0.212	0.155
Manufacturing	0.076	0.120	0.083	0.121
Wholesale trade	-0.338	0.147	-0.342	0.148
Retail trade	-0.100	0.101	-0.102	0.102
Hospitality	-0.349	0.139	-0.352	0.140
Communication/transportation	-0.260	0.176	-0.267	0.177
Finance/insurance/real estates/housing	-0.195	0.174	-0.181	0.177
Data processing	0.213	0.170	0.203	0.172
Business related services	-0.009	0.137	-0.014	0.138
Other services	-0.307	0.163	-0.316	0.162
Derivative	0.640	0.323	0.629	0.327
One additional shareholder	0.235	0.173	0.226	0.174
Two additional shareholders	0.486	0.194	0.493	0.196
Three and more additional shareholders	0.664	0.273	0.642	0.273
Quarter 93/4	-0.825	0.153	-0.795	0.148
Quarter 94/1	-0.280	0.116	-0.289	0.116
Quarter 94/2	-0.386	0.110	-0.384	0.111

Quarter 94/3	-0.448	0.139	-0.452	0.139
Quarter 95/1	-0.022	0.096	-0.010	0.097
Quarter 95/2	-0.460	0.114	-0.455	0.115
Quarter 95/3	-1.101	0.220	-1.107	0.218
Constant	-1.339	0.158	-1.339	0.161
Selection equation				
Bridging allowance	1.631	0.129	1.622	0.128
Initial firm size	0.232	0.064	0.235	0.065
Non-corporate firm	-0.233	0.093	-0.235	0.093
Trade enterprise/sole proprietorship	-0.160	0.060	-0.161	0.061
Manufacturing	0.143	0.098	0.143	0.098
Wholesale trade	0.183	0.104	0.181	0.104
Retail trade	0.019	0.076	0.016	0.076
Hospitality	-0.167	0.094	-0.170	0.094
Communication/transportation	0.068	0.127	0.067	0.127
Finance/insurance/real estates/housing	-0.036	0.111	-0.033	0.111
Data processing	0.129	0.139	0.130	0.140
Business related services	-0.075	0.109	-0.076	0.109
Other services	-0.330	0.102	-0.334	0.102
Derivative	-0.482	0.286	-0.479	0.286
Networks	-0.126	0.073	-0.131	0.074
Female	-0.113	0.055	-0.110	0.055
$25 \leq age < 30$	0.171	0.094	0.173	0.094
$30 \leq age < 35$	0.182	0.091	0.179	0.091
$35 \leq age < 40$	0.158	0.097	0.156	0.097
$40 \leq age < 45$	0.097	0.101	0.097	0.101
$45 \leq age < 50$	0.089	0.107	0.089	0.107
$50 \leq age < 55$	0.014	0.123	0.013	0.123
$55 \leq age < 84$	-0.215	0.122	-0.220	0.121
No experience with respect to payment behaviour	-0.953	0.090	-0.953	0.090
Payment within 30 days	0.473	0.200	0.472	0.203
Payment takes longer	-0.310	0.155	-0.310	0.155
Pays slowly	-0.178	0.070	-0.174	0.071
Payment after reminder	-0.465	0.245	-0.463	0.245
Payments overdue	-1.831	0.304	-1.835	0.303
No credit experience	-1.676	0.080	-1.672	0.080
Limited credit	-0.155	0.062	-0.151	0.062
Secured credit	-0.940	0.167	-0.939	0.167
No credit recommended	-1.034	0.282	-1.036	0.282
Constant	0.999	0.113	1.001	0.113
$\rho_{\epsilon u}/\sigma_{\epsilon u}$	0.245	0.040	0.059	0.035
$\rho_{\epsilon v}/\sigma_{\epsilon v}$	-0.102	0.045	-0.035	0.017
ρ_{uv}	-0.836	0.049	-0.828	0.051

σ_ϵ	0.268	0.269
Log-likelihood	-2,519.269	—
Wald test/F test	$\chi^2(35)=197.98$	F(37.2,378)=5.49
R-squared	—	0.062
Full sample observations	4,632	
Non-censored observations	2,416	

Notes: (i) Regional sample of the ZFSP. (ii) Reference categories for dummy variables are: corporate firm, construction, age < 25, quarter 94/4, no additional shareholders, payment without delay, credit advised or possible. (iii) Estimation includes 21 dummies for different combinations of t1 and t2 in the growth equation. (iv) Robust standard errors using Huber/White/Sandwich estimator of variance covariance matrix. (v) Correlation coefficient for FIML estimation and covariance coefficient for two-step estimation.

Table 33: Firm Growth in East Germany

	FIML estimation		Two-step estimation	
	Coeffi-cient	Standard Error	Coeffi-cient	Standard Error
Growth equation				
Bridging allowance	-0.058	0.023	-0.064	0.060
Initial firm size	-0.293	0.027	-0.294	0.027
Initial firm size squared	0.054	0.008	0.054	0.008
Non-corporate firm	-0.043	0.017	-0.042	0.017
Trade enterprise/sole proprietorship	-0.041	0.016	-0.041	0.016
Manufacturing	0.030	0.026	0.030	0.026
Wholesale trade	-0.041	0.022	-0.041	0.022
Retail trade	-0.059	0.014	-0.059	0.014
Hospitality	0.046	0.042	0.047	0.043
Communication/transportation	0.025	0.032	0.025	0.033
Finance/insurance/real estates/housing	-0.121	0.017	-0.121	0.017
Business related services incl. data processing	-0.069	0.023	-0.069	0.023
Other services	-0.064	0.017	-0.064	0.017
Schwerin	-0.047	0.017	-0.048	0.017
Berlin (East)	-0.019	0.029	-0.019	0.030
Pirna	0.011	0.018	0.011	0.018
Dessau	-0.002	0.019	-0.003	0.019
Networks	0.040	0.019	0.040	0.020
Constant	0.193	0.030	0.195	0.031
Subsidisation equation				
Age of firm at first observation/100	-0.038	0.011	-0.038	0.011
Initial firm size	-0.053	0.010	-0.053	0.010
Non-corporate firm	0.109	0.110	0.105	0.110
Trade enterprise/sole proprietorship	0.283	0.126	0.280	0.126
Manufacturing	0.095	0.105	0.098	0.105

Wholesale trade	0.159	0.108	0.159	0.108
Retail trade	0.085	0.079	0.086	0.079
Hospitality	-0.135	0.116	-0.134	0.116
Communication/transportation	0.000	0.124	0.002	0.124
Finance/insurance/real estates/housing	-0.161	0.118	-0.161	0.118
Business related services incl. data processing	0.093	0.106	0.095	0.106
Other services	-0.149	0.112	-0.148	0.112
One additional shareholder	0.527	0.145	0.526	0.145
Two additional shareholders	0.729	0.172	0.732	0.172
Three and more additional shareholders	0.529	0.284	0.525	0.283
Quarter 93/4	-0.547	0.111	-0.546	0.111
Quarter 94/1	-0.359	0.097	-0.359	0.098
Quarter 94/2	-0.490	0.099	-0.488	0.099
Quarter 94/3	-0.295	0.096	-0.294	0.096
Quarter 95/1	-0.019	0.086	-0.020	0.087
Quarter 95/2,3	-0.668	0.099	-0.667	0.099
Constant	-1.172	0.149	-1.169	0.150
Selection equation				
Bridging allowance	1.361	0.171	1.358	0.174
Initial firm size	0.550	0.102	0.551	0.102
Initial firm size squared	-0.083	0.027	-0.083	0.027
Non-corporate firm	-0.336	0.084	-0.337	0.084
Trade enterprise/sole proprietorship	-0.317	0.071	-0.318	0.071
Manufacturing	-0.088	0.088	-0.088	0.088
Wholesale trade	-0.443	0.094	-0.444	0.094
Retail trade	-0.297	0.070	-0.297	0.070
Hospitality	-0.516	0.095	-0.517	0.095
Communication/transportation	-0.233	0.102	-0.233	0.102
Finance/insurance/real estates/housing	-0.314	0.093	-0.314	0.093
Business related services incl. data processing	-0.356	0.090	-0.356	0.090
Other services	-0.333	0.089	-0.333	0.089
Schwerin	0.415	0.075	0.415	0.075
Berlin (East)	-0.171	0.090	-0.172	0.090
Pirna	-0.027	0.075	-0.027	0.075
Dessau	0.053	0.073	0.053	0.074
Networks	0.096	0.056	0.096	0.056
Female	-0.151	0.054	-0.150	0.054
No experience with respect to payment behaviour	-0.941	0.084	-0.941	0.084
Payment takes longer	-0.302	0.128	-0.303	0.128
Pays slowly	0.034	0.069	0.032	0.069
Payment after reminder	-0.541	0.188	-0.546	0.189
Payments overdue	-2.083	0.197	-2.090	0.198

No credit experience	-1.538	0.088	-1.538	0.088
Limited credit	-0.259	0.065	-0.259	0.065
Secured credit	-0.790	0.142	-0.789	0.142
No credit recommended	-1.030	0.193	-1.026	0.193
Constant	1.127	0.122	1.129	0.123
$\rho_{\epsilon u}/\sigma_{\epsilon u}$	0.077	0.027	0.025	0.028
$\rho_{\epsilon v}/\sigma_{\epsilon v}$	-0.036	0.034	-0.014	0.017
ρ_{uv}	-0.644	0.099	-0.643	0.101
σ_{ϵ}	0.281		0.284	
Log-likelihood	-3,678.794		—	
Wald test/F test	$\chi^2(41)$=270.59		F(43,2,391)=6.18	
R-squared	—		0.130	
Full sample observations	5,084			
Non-censored observations	2,435			

Notes: (i) Regional sample of the ZFSP. (ii) Reference categories for dummy variables are: corporate firm, construction, age < 25, quarter 94/4, no additional shareholders, payment without delay or within 30 days, credit advised or possible. (iii) Estimation includes 23 dummies for different combinations of t1 and t2 in the growth. (iv) Robust standard errors using Huber/White/Sandwich estimator of variance covariance matrix. (v) Correlation coefficient for FIML estimation and covariance coefficient for two-step estimation.

8.4 Summary and Conclusions

The results of the econometric analysis indicate that start-ups from unemployment in East German regions have a lower one-year survival probability than non-subsidised firms. The two- through five-year survival probability of subsidised firms, however, does not significantly differ from that of non-subsidised start-ups. In West Germany, the results tend to be more positive. Bridging allowance increases the three- and five-year survival probability, though both estimation results are not robust.

In terms of employment growth, subsidised start-ups perform worse than non-subsidised. For West Germany, subsidised start-ups by the unemployed have a 13.3% lower growth rate than other start-ups. For the eastern parts, the growth rate is 5.8% lower. Therefore, bridging allowance has a negative impact on the number of jobs created in the firms founded by unemployed individuals.

Despite remaining theoretical and econometric problems, the presence of a negative impact on employment growth and a significant negative impact on the one-year firm survival in the group of programme participants raises several policy questions. The results do not seem to support the effectiveness and efficiency of bridging allowance, at least as an instrument of creating additional employment through the promotion of self-employment among the unemployed in Germany. One reason for this result is presumably the design of the programme, which seems to support opportunistic or myopic behaviour in the group of unemployed

persons who receive bridging allowance. The existence of opportunistic behaviour is confirmed by the fact that only during the first year after foundation a negative effect on the survival probability of the firm can be found.

However, bridging allowance seems to attain the direct aim of creating stable employment for the formerly unemployed since in the long run subsidised start-ups do not have higher mortality rates than non-subsidised. Though, the question of efficiency still remains unsettled.

The reason for this inefficiency might be the fact that bridging allowance is a non-refundable grant which in fact prolongs the entitlement period of unemployment benefits by six months. This kind of legal arrangement favours opportunistic behaviour. Therefore, businesses may be started to receive additional unemployment benefits instead of founding a growing company. As a consequence, political authorities should consider revising bridging allowance to a (partly) refundable loan and building up a monitoring system for the period after the start-up. Such a monitoring system would guarantee the exclusion of non-active firms from receiving bridging allowance and, as a result, the classification of the entrepreneur as unemployed. This would prevent an extension of the entitlement period. The conversion of bridging allowance to a refundable loan, could prevent the formation of businesses with low expected revenues and therefore not only improve the average growth rate for start-ups by the unemployed, but also reduce the crowding-out effect.

Part IV

Concluding Remarks

9 Political Options and Future Research

This study provided an evaluation of bridging allowance at the individual as well as at the firm level. For Germany analyses concerning the transition from unemployment to self-employment and its subsidisation are rather scarce up to date. Nevertheless, it is important to evaluate firm start-ups by the unemployed since about 1.5 billion DM are spent on bridging allowance yearly. As a consequence of this extensive subsidisation nearly one fifth of the new self-employed are out of unemployment. The aim of bridging allowance is to reduce unemployment by regaining employment for the subsidised individuals through self-employment and by creating new jobs through the newly founded firms.

The evaluation at the individual level of the success of this route out of unemployment followed the "potential-outcome-approach to causality" by using discrete hazard rate models to estimate survival in self-employment compared to the hypothetical survival in paid-employment. The estimation points to a positive result for self-employment as a permanent way out of unemployment as self-employment initially after unemployment proves to be more stable than paid-employment would have been. Furthermore, a more generous grant of bridging allowance improves employment stability. However, this convincing result for self-employment as a worthwhile escape from unemployment is mitigated by the fact that also those entering paid-employment would have been better off in self-employment. In particular, this is the case for the group of the high-skilled. Bridging allowance may have helped to overcome liquidity constraints, but particularly among the high-skilled a lack of capital still is present. Therefore, even a generous, unrestricted grant of bridging allowance is not enough to activate a large portion of the high-skilled founder potential.

This result also raises the question of dead-weight effects caused by that programme. Estimation results showed that those entering self-employment are a positive selection, i.e. better educated, out of the pool of the unemployed. Hence, if bridging allowance is not suited to activate the high-skilled among the unemployed, probably those (or part of them) who entered self-employment would have started a business also without this kind of subsidisation. Such a behaviour would only raise the number of the temporary unemployed, but not increase the number of self-employed people.

The impact of bridging allowance at the firm level is assessed by simultaneous selection models. Based on the estimation results bridging allowance has no impact on the firm survival in East Germany and a slightly positive effect in West Germany. One exception from these findings emerges: Start-ups from unemployment in the East German regions have a lower one-year survival probability than

non-subsidised firms. Therefore, at least for the new federal states, opportunistic behaviour cannot be ruled out. Some of the unemployed firm founders may have received bridging allowance only to extend the entitlement period of unemployment assistance by six months instead of founding a growing company. However, the portion of those people is fairly small compared to all subsidised unemployed and, at least in the long-run, bridging allowance slightly improves the stability of the firms.

In contrast to these findings, a negative result for the impact of bridging allowance arises for employment growth. In both regions of Germany start-ups subsidised with bridging allowance face a lower employment growth rate than their non-subsidised counterparts.

Based on these findings, at the individual as well as at the firm level, the achievement of the two objectives of bridging allowance can be rated as follows: Firstly, the direct aim of creating stable employment for the formerly unemployed is attained, secondly, the indirect aim of creating additional employment through the newly founded firms is missed.

Therefore, as a political consequence, it is important to offer bridging allowance, as it could lower capital constraints and therefore open the door to self-employment for a greater number of unemployed people who are suited for self-employment. Moreover, this offer should not be restricted by limitations. However, a liberal use of bridging allowance or even an extension of bridging allowance could cause serious dead-weight effects. Though, the shortcoming of this programme is rather the circumstance that the grant of bridging allowance is non-refundable than the fact that the funds are hardly limited. As a consequence, political authorities should consider revising bridging allowance to a (partly) refundable loan and building up a monitoring system for the period after the start-up. The conversion of bridging allowance in a partly refundable loan would reduce the costs arising from people willing to start a business and becoming unemployed only to become entitled to bridging allowance. On the other hand, a monitoring system may help to prevent the foundation of inactive businesses. In the context of such a monitoring system, the firm founder has to prove e.g. the activity of his or her business. Supposing the "entrepreneur" fails the proof, the entitlement to unemployment benefits is reduced by the amount of bridging allowance received. Furthermore, the implementation of additional training before the start-up or stricter regulations for the assessment of sustainability can improve the effectiveness and efficiency of bridging allowance, in particular in terms of employment growth. Present experience of the so-called Start-Up Office ("Büro für Existenzgründungen") in Munich, which implemented in co-operation with the local labour market office an additional training programme as well as an advanced assessment process seems to support this hypothesis (see Büro für Existenzgründungen, 1999). However, these findings are only of a descriptive nature. An econometric evaluation has not been carried out, so far.

Even if these improvements of bridging allowance would be implemented, the effects of that programme on the reduction of unemployment should not be overestimated, as only a small part of the unemployed is suited for self-employment. Moreover, the net employment effects are difficult to quantify as crowding-out ef-

fects caused by the subsidised start-ups are hardly measurable. However, compared to other active labour market programmes the costs of bridging allowance are relatively low.

In future work, it will be an important task to assess the impacts of bridging allowance at the individual level more precisely than it is possible on the basis of the available data. Therefore, even if this argument seems to be banal, better data is necessary for future research. The crucial point of the GSOEP data is that the information on the receipt of bridging allowance is missing. Data sets, which can provide such information are the administrative data on the beneficiaries held by the Federal Employment Services. A further advantage of these data is the large sample size compared to the GSOEP. Although the analysis at the firm level is based on a quite large data set, the treatment group of subsidised firms is relatively small. The data used in Wießner's (2001) study, and also held by the Federal Employment Services, extended by a control group, would improve the analysis considerably, in particular in addressing the question of indirect job creation.

Appendix

A.1 Calculation of the IRR and SPIR

The IRR is calculated as the ratio of unemployment benefits and expected monthly gross income from the chosen occupation, i.e. self- or paid-employment.[130] The SPIR is the ratio of the expected monthly gross income form self-employment and paid-employment. The application of expected income follows the theoretical concepts of Chapter 5. Hence, occupational choice is rather based on expected figures, than on previous earnings.
Therefore, to calculate the IRR and SPIR, respectively, an estimation of income from self- and paid-employment is necessary.

The earnings equation are derived from the GSOEP sample constructed for the analysis of Chapter 6. Thus, only earnings of individuals, which were at least unemployed for one month are considered. Furthermore, the estimation is carried out for West and East Germany, separately. For earnings from paid-employment reduced ordinary least squares regressions are carried out for each of the sixteen years between 1984 and 1999. For the self-employed the panel has to be pooled, because of the small number of observations per year. Therefore, sixteen earnings equations are estimated for the paid-employed in West Germany, nine equations for the paid-employed in East Germany, and one equation for each region for the self-employed.

To correct for the selectivity of occupational choice and a potential selection-bias due to labour market participation, reduced earnings equations are estimated, i.e. beside variables explaining earnings, the equations also include variables explaining occupational choice and labour market participation. Hence, I follow the concept of the linear control function estimator introduced by Barnow et al. (1980). Therefore the estimation equation is

$$\ln y_{ijt} = \gamma'_j z_{ijt} + \omega'_j v_{ijt} + u_{ijt} \,. \tag{A.1}$$

y_{ijt} denotes the monthly income from occupation j (self- or paid-employed) of individual i in year t. z_{ijt} represents the vector of exogenous variables explaining the amount of income, whereas v_{ijt} is a vector including the variables explaining occupational choice and labour market participation. γ_j and ω_j are the corresponding coefficient vectors. Finally, u_{ijt} represents an independent and identical normal distributed error term with mean zero and variance σ_{jt}^2.

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[130] See Steiner (1997) for the calculation of the IRR on the basis of expected earnings.

Following the concept of the Mincer-earnings function (see Mincer,1974) the vector z includes years of schooling, experience and experience squared. Furthermore, job related variables are included, i.e. for West Germany tenure [131], for both regions industry and for the paid-employed firm size. Variables controlling for occupational choice and labour market participation are gender, nationality, marital status, children, employment status of the spouse, income of the spouse, capital income, housing ownership, federal state, size of city. In the estimation of the self-employment earnings GDP growth rate and unemployment to vacancy ratio are included to control for time series effects. The estimation results are displayed in Table 34 to Table 40.

On the basis of the estimated coefficients for each individual a time-varying income from self- and paid-employment, respectively, is calculated for each month of unemployment duration. The SPIR is defined as the ratio of self-employment to paid-employment income. The IRR is also calculated as time-varying variable, defined as the ratio of unemployment benefits and the income from the chosen occupation. Thus, if the individual exits into paid-employment gross monthly income form paid-employment is used and if he or she exits into self-employment the earnings from self-employment are used. In the case where the unemployment spell is right censored a weighted IRR is calculated. The weights are derived from the population shares of self- and paid-employment, respectively.

[131] For East Germany a tenure variable is not available in the GSOEP.

Table 34: Estimation of Income from Paid-Employment for West Germany Between 1984 and 1988

Year	84		85		86		87		88	
	Coeffi-cient	Standard Error	Coeffi-cient	Standard Error	Coeffi-cient.	Standard Error	Coeffi-cient	Standard Error	Coeffi-cient	Standard Error
Years of schooling	0.071	0.006	0.069	0.006	0.079	0.006	0.077	0.006	0.073	0.006
Experience/10	0.055	0.005	0.042	0.005	0.048	0.006	0.044	0.005	0.050	0.006
Experience/10 squared	-0.001	0.000	-0.001	0.000	-0.001	0.000	-0.001	0.000	-0.001	0.000
Tenure	0.006	0.002	0.007	0.002	0.005	0.002	0.006	0.002	0.009	0.002
Male	0.333	0.037	0.310	0.036	0.292	0.035	0.332	0.039	0.369	0.036
Foreigner	0.002	0.031	-0.005	0.033	0.025	0.032	0.014	0.033	0.032	0.033
Disabled	-0.070	0.063	-0.078	0.070	-0.138	0.069	-0.080	0.066	-0.053	0.070
Single	0.021	0.052	-0.073	0.057	-0.066	0.048	0.007	0.053	0.030	0.049
Not married	0.191	0.073	0.149	0.065	0.078	0.060	0.085	0.086	0.203	0.072
Children < 16	-0.131	0.030	-0.102	0.032	-0.117	0.031	-0.134	0.034	-0.237	0.031
Capital income	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Spouse employed	0.271	0.058	0.118	0.066	0.215	0.066	0.216	0.076	0.248	0.061
Spouse not employed	0.260	0.049	0.158	0.055	0.139	0.052	0.195	0.053	0.221	0.051
Income of spouse	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Housing ownership	-0.029	0.037	-0.016	0.039	0.002	0.038	-0.064	0.041	-0.076	0.037
Agriculture	-0.021	0.096	0.015	0.167	0.000	0.130	-0.106	0.211	-0.013	0.189
Mining/energy	0.117	0.138	-0.045	0.178	0.050	0.147	-0.002	0.112	-0.010	0.114
Construction	-0.034	0.038	-0.062	0.042	-0.017	0.045	0.025	0.044	-0.076	0.045
Trade	-0.105	0.053	-0.161	0.053	-0.146	0.051	-0.137	0.050	-0.108	0.050
Transport./communic.	0.050	0.087	-0.040	0.090	-0.148	0.093	-0.142	0.091	0.035	0.063
Banking/insurance	0.173	0.092	0.209	0.098	0.136	0.081	0.221	0.072	0.241	0.097
Services	-0.044	0.048	-0.100	0.050	-0.159	0.050	-0.119	0.054	-0.108	0.054

Non-business organisat.	-0.195	0.149	-0.160	0.113	-0.198	0.105	-0.252	0.105	-0.215	0.115
Reg. auth./soc. security	-0.006	0.067	-0.071	0.061	-0.034	0.050	-0.165	0.081	-0.003	0.051
Others	-0.364	0.088	-0.297	0.080	-0.139	0.082	-0.062	0.280	-0.123	0.373
< 20 employee	-0.971	0.124	0.341	0.242	0.113	0.362	-0.307	0.414	-0.083	0.496
20-199 employees	0.139	0.038	0.171	0.042	0.100	0.040	0.128	0.042	0.128	0.040
200-1999 employees	0.185	0.041	0.208	0.044	0.164	0.041	0.201	0.043	0.232	0.041
≥2000 employees	0.178	0.043	0.223	0.045	0.191	0.045	0.223	0.046	0.252	0.045
Schleswig-Holstein	0.037	0.078	0.024	0.106	0.027	0.078	-0.047	0.092	-0.031	0.091
Hamburg	-0.192	0.103	-0.179	0.098	-0.174	0.106	-0.239	0.113	-0.303	0.113
Bremen	-0.122	0.059	-0.098	0.061	-0.100	0.056	-0.117	0.059	-0.109	0.054
Niedersachsen	-0.186	0.115	-0.441	0.130	-0.477	0.146	-0.375	0.154	-0.286	0.101
Hesse	-0.015	0.052	-0.009	0.052	-0.021	0.053	-0.022	0.052	-0.086	0.052
Rhineland-Pal./Saarland	-0.015	0.055	-0.082	0.057	-0.021	0.055	0.054	0.058	-0.013	0.057
Baden-Württemberg	0.018	0.042	-0.023	0.042	0.016	0.040	-0.007	0.044	0.035	0.042
Bavaria	0.037	0.039	0.007	0.039	-0.039	0.041	-0.017	0.043	-0.030	0.044
Berlin (West)	0.041	0.067	-0.132	0.076	-0.010	0.069	-0.079	0.064	-0.120	0.062
2,000 to 5,000 citizens	0.021	0.070	-0.054	0.081	0.076	0.090	0.172	0.114	0.049	0.087
5,000 to 20,000 citizens	-0.036	0.068	-0.053	0.074	0.009	0.083	0.087	0.112	-0.019	0.079
20,000 to 50,000 citiz.	-0.110	0.073	-0.072	0.080	0.013	0.086	0.098	0.113	0.041	0.083
50,000 to 100,000 citiz.	-0.173	0.078	-0.089	0.082	-0.030	0.089	0.028	0.115	-0.114	0.085
100,000 to 500,000 citiz.	-0.087	0.075	-0.067	0.080	0.012	0.085	0.072	0.114	-0.088	0.082
More than 500,000 citiz.	-0.025	0.076	0.025	0.082	0.081	0.091	0.226	0.117	0.145	0.085
Constant	-1.076	0.119	-0.800	0.125	-0.940	0.133	-1.060	0.148	-0.908	0.125
Number of observations	1,259		1,188		1,233		1,323		1,382	

Notes: (i) Ordinary least squares estimation based on the year specific wave of the GSOEP. (ii) Robust standard errors using Huber/White/Sandwich estimator of variance covariance matrix (see White, 1982).

Table 35: Estimation of Income from Paid-Employment for West Germany Between 1989 and 1993

Year	89		90		91		92		93	
	Coeffi-cient	Standard Error	Coeffi-cient	Standard Error	Coeffi-cient.	Standard Error	Coeffi-cient	Standard Error	Coeffi-cient	Standard Error
Years of schooling	0.069	0.005	0.073	0.006	0.079	0.006	0.077	0.006	0.073	0.006
Experience/10	0.042	0.005	0.042	0.005	0.048	0.006	0.044	0.005	0.050	0.006
Experience/10 squared	-0.001	0.000	-0.001	0.000	-0.001	0.000	-0.001	0.000	-0.001	0.000
Tenure	0.007	0.002	0.005	0.002	0.005	0.002	0.006	0.002	0.009	0.002
Male	0.334	0.032	0.329	0.033	0.292	0.035	0.332	0.039	0.369	0.036
Foreigner	-0.042	0.030	-0.028	0.029	0.025	0.032	0.014	0.033	0.032	0.033
Disabled	-0.020	0.052	-0.048	0.057	-0.138	0.069	-0.080	0.066	-0.053	0.070
Single	0.014	0.041	-0.046	0.048	-0.066	0.048	0.007	0.053	0.030	0.049
Not married	0.120	0.054	0.065	0.064	0.078	0.060	0.085	0.086	0.203	0.072
Children < 16	-0.184	0.029	-0.158	0.030	-0.117	0.031	-0.134	0.034	-0.237	0.031
Capital income	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Spouse employed	0.264	0.052	0.127	0.060	0.215	0.066	0.216	0.076	0.248	0.061
Spouse not employed	0.211	0.044	0.193	0.048	0.139	0.052	0.195	0.053	0.221	0.051
Income of spouse	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Housing ownership	-0.061	0.033	-0.001	0.032	0.002	0.038	-0.064	0.041	-0.076	0.037
Agriculture	0.094	0.171	-0.163	0.180	0.000	0.130	-0.106	0.211	-0.013	0.189
Mining/energy	-0.027	0.121	-0.005	0.114	0.050	0.147	-0.002	0.112	-0.010	0.114
Construction	0.036	0.041	0.002	0.046	-0.017	0.045	0.025	0.044	-0.076	0.045
Trade	-0.048	0.047	-0.066	0.052	-0.146	0.051	-0.137	0.050	-0.108	0.050
Transport./communic.	0.133	0.061	-0.031	0.070	-0.148	0.093	-0.142	0.091	0.035	0.063
Banking/insurance	0.234	0.079	0.191	0.116	0.136	0.081	0.221	0.072	0.241	0.097
Services	-0.071	0.047	-0.061	0.047	-0.159	0.050	-0.119	0.054	-0.108	0.054

Non-business organisat.	-0.193	0.100	-0.100	0.087	-0.198	0.105	-0.252	0.105	-0.215	0.115
Reg. auth./soc. security	-0.086	0.056	-0.110	0.061	-0.034	0.050	-0.165	0.081	-0.003	0.051
Others	0.067	0.198	-0.019	0.106	-0.139	0.082	-0.062	0.280	-0.123	0.373
< 20 employee	-0.474	0.444	-0.691	0.350	0.113	0.362	-0.307	0.414	-0.083	0.496
20-199 employees	0.208	0.036	0.239	0.038	0.100	0.040	0.128	0.042	0.128	0.040
200-1999 employees	0.275	0.039	0.294	0.041	0.164	0.041	0.201	0.043	0.232	0.041
≥2000 employees	0.282	0.042	0.320	0.043	0.191	0.045	0.223	0.046	0.252	0.045
Schleswig-Holstein	0.018	0.086	0.034	0.078	0.027	0.078	-0.047	0.092	-0.031	0.091
Hamburg	-0.245	0.100	-0.012	0.108	-0.174	0.106	-0.239	0.113	-0.303	0.113
Bremen	-0.073	0.050	0.001	0.051	-0.100	0.056	-0.117	0.059	-0.109	0.054
Niedersachsen	-0.261	0.096	-0.162	0.101	-0.477	0.146	-0.375	0.154	-0.286	0.101
Hesse	-0.045	0.046	0.024	0.049	-0.021	0.053	-0.022	0.052	-0.086	0.052
Rhineland-Pal./Saarland	-0.049	0.055	-0.004	0.067	-0.021	0.055	0.054	0.058	-0.013	0.057
Baden-Württemberg	0.031	0.037	0.103	0.039	0.016	0.040	-0.007	0.044	0.035	0.042
Bavaria	-0.004	0.038	0.075	0.039	-0.039	0.041	-0.017	0.043	-0.030	0.044
Berlin (West)	-0.150	0.068	-0.090	0.070	-0.010	0.069	-0.079	0.064	-0.120	0.062
2,000 to 5,000 citizens	-0.006	0.070	0.145	0.080	0.076	0.090	0.172	0.114	0.049	0.087
5,000 to 20,000 citizens	-0.066	0.063	0.054	0.075	0.009	0.083	0.087	0.112	-0.019	0.079
20,000 to 50,000 citiz.	0.024	0.066	0.185	0.077	0.013	0.086	0.098	0.113	0.041	0.083
50,000 to 100,000 citiz.	-0.177	0.070	-0.012	0.080	-0.030	0.089	0.028	0.115	-0.114	0.085
100,000 to 500,000 citiz.	-0.109	0.067	0.120	0.078	0.012	0.085	0.072	0.114	-0.088	0.082
More than 500,000 citiz.	0.075	0.069	0.211	0.080	0.081	0.091	0.226	0.117	0.145	0.085
Constant	-0.712	0.109	-0.859	0.125	-0.940	0.133	-1.060	0.148	-0.908	0.125
Number of observations	1,501		1,454		1,233		1,323		1,382	

Notes: (i) Ordinary least squares estimation based on the year specific wave of the GSOEP. (ii) Robust standard errors using Huber/White/Sandwich estimator of variance covariance matrix (see White, 1982).

Table 36: Estimation of Income from Paid-Employment for West Germany Between 1994 and 1998

Year	94		95		96		97		98	
	Coeffi-cient	Standard Error	Coeffi-cient	Standard Error	Coeffi-cient.	Standard Error	Coeffi-cient	Standard Error	Coeffi-cient	Standard Error
Years of schooling	0.053	0.006	0.062	0.005	0.057	0.006	0.056	0.006	0.049	0.006
Experience/10	0.058	0.006	0.060	0.005	0.052	0.006	0.039	0.006	0.048	0.006
Experience/10 squared	-0.001	0.000	-0.001	0.000	-0.001	0.000	-0.001	0.000	-0.001	0.000
Tenure	0.004	0.002	0.004	0.002	0.008	0.002	0.008	0.002	0.017	0.003
Male	0.405	0.037	0.396	0.035	0.387	0.033	0.391	0.035	0.441	0.037
Foreigner	-0.039	0.030	-0.028	0.031	0.002	0.033	-0.058	0.033	-0.046	0.037
Disabled	-0.177	0.053	-0.160	0.050	0.019	0.053	-0.037	0.048	-0.073	0.059
Single	-0.023	0.050	0.053	0.046	0.068	0.052	-0.002	0.049	0.060	0.049
Not married	0.133	0.059	0.209	0.050	0.283	0.055	0.168	0.052	0.077	0.057
Children < 16	-0.189	0.032	-0.233	0.033	-0.225	0.035	-0.183	0.034	-0.187	0.034
Capital income	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Spouse employed	0.132	0.068	0.211	0.068	0.206	0.049	0.158	0.063	0.072	0.064
Spouse not employed	0.185	0.052	0.241	0.047	0.287	0.057	0.257	0.048	0.181	0.050
Income of spouse	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Housing ownership	-0.003	0.035	0.045	0.034	0.003	0.035	0.024	0.035	-0.013	0.036
Agriculture	-0.073	0.110	0.067	0.092	0.041	0.136	0.082	0.071	0.122	0.101
Mining/energy	0.035	0.091	0.157	0.078	0.066	0.079	0.076	0.084	0.061	0.066
Construction	0.031	0.041	0.031	0.038	0.039	0.042	0.058	0.044	-0.025	0.046
Trade	-0.132	0.052	-0.121	0.050	-0.149	0.052	-0.216	0.046	-0.240	0.050
Transport./communic.	-0.038	0.067	-0.018	0.060	-0.014	0.062	-0.005	0.059	-0.083	0.056
Banking/insurance	0.012	0.130	0.028	0.116	-0.070	0.098	-0.111	0.099	-0.095	0.108
Services	-0.111	0.049	-0.092	0.043	-0.139	0.046	-0.162	0.046	-0.130	0.045

Non-business organisat.	-0.269	0.128	-0.089	0.082	-0.053	0.098	-0.151	0.087	-0.180	0.092
Reg. auth./soc. security	-0.149	0.058	-0.078	0.059	-0.051	0.049	-0.025	0.050	-0.032	0.056
Others	0.006	0.058	-0.047	0.064	-0.059	0.069	-0.077	0.064	-0.065	0.065
< 20 employees	-1.255	0.135	-0.116	0.111	-0.878	0.091	0.273	0.099	-0.641	0.302
20-199 employees	0.270	0.041	0.211	0.036	0.151	0.040	0.164	0.039	0.187	0.040
200-1999 employees	0.309	0.041	0.276	0.039	0.259	0.042	0.272	0.040	0.267	0.042
≥2000 employees	0.399	0.043	0.303	0.043	0.283	0.046	0.354	0.044	0.338	0.045
Schleswig-Holstein	-0.069	0.111	-0.034	0.081	-0.013	0.092	0.041	0.095	0.082	0.094
Hamburg	0.053	0.087	0.073	0.098	0.066	0.131	0.032	0.123	-0.121	0.146
Bremen	-0.134	0.058	-0.067	0.048	0.013	0.052	-0.036	0.049	-0.004	0.047
Niedersachsen	-0.099	0.072	-0.082	0.094	0.117	0.087	-0.071	0.087	-0.104	0.094
Hesse	-0.039	0.054	0.067	0.052	0.100	0.054	0.072	0.055	0.063	0.055
Rhineland-Pal./Saarland	-0.024	0.060	-0.008	0.063	0.037	0.067	0.121	0.065	0.041	0.070
Baden-Württemberg	0.042	0.043	0.089	0.044	0.073	0.048	0.119	0.047	0.057	0.046
Bavaria	-0.029	0.041	-0.006	0.042	0.080	0.044	0.109	0.043	0.100	0.046
Berlin (West)	-0.035	0.064	0.113	0.069	0.078	0.080	0.047	0.069	0.027	0.081
2,000 to 5,000 citizens	0.104	0.084	0.048	0.080	0.026	0.083	0.006	0.081	0.053	0.083
5,000 to 20,000 citizens	-0.001	0.083	0.071	0.075	0.040	0.076	0.149	0.066	0.114	0.073
20,000 to 50,000 citiz.	0.075	0.086	0.089	0.076	0.057	0.082	0.231	0.070	0.219	0.075
50,000 to 100,000 citiz.	-0.009	0.090	0.075	0.079	0.032	0.081	0.131	0.074	0.135	0.080
100,000 to 500,000 citiz.	0.029	0.088	0.021	0.081	0.084	0.081	0.166	0.072	0.158	0.078
More than 500,000 citiz.	0.103	0.091	0.060	0.084	0.057	0.086	0.200	0.077	0.276	0.084
Constant	-0.453	0.144	-0.594	0.133	-0.486	0.148	-0.329	0.137	-0.339	0.138
Number of observations	1,434		1,424		1,436		1,387		1,346	

Notes: (i) Ordinary least squares estimation based on the year specific wave of the GSOEP. (ii) Robust standard errors using Huber/White/Sandwich estimator of variance covariance matrix (see White, 1982).

Table 37: Estimation of Income from Paid-Employment for West Germany in 1999

	99	
	Coeffi-cient	Standard Error
Years of schooling	0.053	0.006
Experience/10	0.039	0.007
Experien./10 squared	-0.001	0.000
Tenure	0.016	0.003
Male	0.407	0.037
Foreigner	0.012	0.037
Disabled	-0.146	0.071
Single	0.065	0.047
Not married	0.151	0.053
Children < 16	-0.190	0.038
Capital income	0.000	0.000
Spouse employed	0.065	0.057
Spouse not employed	0.206	0.053
Income of spouse	0.000	0.000
Housing ownership	0.059	0.036
Agriculture	-0.005	0.101
Mining/energy	0.034	0.098
Construction	0.018	0.054
Trade	-0.216	0.048
Transportation/communication	-0.081	0.059
Banking/insurance	-0.033	0.099
Services	-0.114	0.045
Non-business organisation	-0.059	0.085
Regional authority/social security	-0.084	0.069
Others	-0.097	0.074
< 20 employees	0.127	0.103
20-199 employees	0.142	0.041
200-1999 employees	0.261	0.043
≥2000 employees	0.283	0.044
Schleswig-Holstein	0.005	0.099
Hamburg	-0.393	0.168
Bremen	-0.062	0.051
Niedersachsen	-0.243	0.091
Hesse	0.062	0.058
Rhineland-P./Saarland	-0.026	0.071
Baden-Württemberg	0.086	0.049
Bavaria	0.129	0.046
Berlin (West)	-0.057	0.111

2,000 to 5,000 citizens	0.058	0.099
5,000 to 20,000 citizens	0.036	0.088
20,000 to 50,000 citizens	0.126	0.091
50,000 to 100,000 citizens	0.001	0.095
100,000 to 500,000 citizens	0.113	0.090
More than 500,000 citizens	0.232	0.099
Constant	-0.166	0.155
Number of observations	1,202	

Notes: (i) Ordinary least squares estimation based on the year specific wave of the GSOEP. (ii) Robust standard errors using Huber/White/Sandwich estimator of variance covariance matrix (see White, 1982).

Table 38: Estimation of Income from Paid-Employment for East Germany Between 1991 and 1995

	91		92		93		94		95	
	Coeffi-cient	Standard Error	Coeffi-cient	Standard Error	Coeffi-cient	Standard Error	Coeffi-cient	Standard Error	Coeffi-cient	Standard Error
Years of schooling	0.095	0.008	0.103	0.008	0.103	0.008	0.112	0.009	0.116	0.010
Experience/10	0.029	0.006	0.036	0.006	0.035	0.007	0.059	0.007	0.038	0.007
Experience/10 squared	-0.001	0.000	-0.001	0.000	-0.001	0.000	-0.001	0.000	-0.001	0.000
Male	0.284	0.028	0.217	0.031	0.216	0.034	0.189	0.032	0.225	0.035
Foreigner	-0.274	0.075	-0.023	0.077	0.253	0.173	-0.440	0.303	-0.171	0.222
Disabled	-0.038	0.078	-0.173	0.100	-0.077	0.096	-0.105	0.078	-0.011	0.099
Single	0.007	0.048	0.032	0.054	-0.011	0.053	0.110	0.058	0.027	0.066
Not married	0.115	0.045	0.124	0.059	0.088	0.066	0.053	0.079	0.077	0.076
Children < 16	-0.027	0.034	-0.004	0.034	-0.050	0.042	-0.080	0.038	-0.019	0.040
Capital income	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Spouse employed	0.105	0.053	0.174	0.067	0.166	0.074	0.224	0.074	0.140	0.074
Spouse not employed	0.167	0.050	0.211	0.059	0.185	0.057	0.297	0.056	0.179	0.066
Income of spouse	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Housing ownership	0.010	0.036	0.057	0.038	0.060	0.043	0.014	0.039	0.010	0.039
Agriculture	-0.178	0.051	-0.017	0.050	-0.025	0.056	-0.089	0.063	0.026	0.064
Mining/energy	0.143	0.062	0.182	0.063	0.249	0.080	0.234	0.096	0.171	0.119
Construction	0.203	0.054	0.293	0.053	0.229	0.048	0.242	0.042	0.172	0.044
Trade	0.061	0.038	0.009	0.050	0.003	0.055	0.004	0.048	-0.104	0.064
Transp./communic.	0.133	0.059	0.158	0.058	0.219	0.060	0.171	0.066	-0.003	0.083
Banking/insurance	0.212	0.145	0.375	0.073	0.028	0.132	0.173	0.108	0.170	0.126
Services	-0.026	0.041	0.080	0.049	0.065	0.054	-0.005	0.051	-0.002	0.054
Non-business organis.	-0.420	0.222	-0.020	0.110	0.093	0.168	0.054	0.132	-0.050	0.110

Reg. Auth./soc. Secur.	-0.034	0.047	0.062	0.045	0.127	0.047	0.026	0.050	0.085	0.051
Others	0.086	0.075	0.154	0.084	-0.103	0.094	-0.159	0.092	-0.139	0.079
< 20 employee	-0.637	0.063	-0.207	0.373	-0.102	0.306	-0.323	0.153		
20-199 employees	0.031	0.041	0.054	0.036	0.120	0.037	0.071	0.034	0.146	0.038
200-1999 employees	-0.001	0.039	0.093	0.041	0.167	0.042	0.138	0.043	0.155	0.047
≥2000 employees	0.010	0.046	0.036	0.047	0.211	0.051	0.175	0.059	0.210	0.060
Meckl.-Vorpommern	-0.038	0.077	-0.092	0.089	-0.019	0.099	0.002	0.097	0.097	0.115
Brandenburg	-0.084	0.074	-0.084	0.085	-0.038	0.092	0.015	0.092	0.040	0.114
Sachsen-Anhalt	-0.073	0.072	-0.109	0.085	-0.069	0.092	0.014	0.094	0.020	0.116
Thuringia	-0.036	0.073	-0.133	0.085	-0.082	0.089	-0.054	0.091	0.067	0.111
Saxony	-0.097	0.062	-0.090	0.074	-0.059	0.080	-0.033	0.080	-0.016	0.102
2,000 to 20,000 citizens	0.007	0.041	0.010	0.042	0.052	0.048	-0.047	0.041	0.029	0.042
20,000 to 100,000 citiz.	0.070	0.043	0.039	0.047	0.077	0.052	0.023	0.047	0.082	0.049
100,000 to 500,000 citiz.	0.071	0.051	0.132	0.051	0.079	0.062	0.061	0.056	0.124	0.062
More than 500,000 citiz.	0.062	0.063	0.083	0.069	0.174	0.081	0.130	0.078	0.258	0.096
Constant	-1.522	0.148	-1.389	0.167	-1.151	0.161	-1.295	0.171	-1.240	0.198
Num. of observations	981		871		785		774		809	

Notes: (i) Ordinary least squares estimation based on the year specific wave of the GSOEP. (ii) Robust standard errors using Huber/White/Sandwich estimator of variance covariance matrix (see White, 1982).

Table 39: Estimation of Income from Paid-Employment for East Germany Between 1996 and 1999

	96		97		98		99	
	Coeffi-cient	Standard Error	Coeffi-cient	Standard Error	Coeffi-cient	Standard Error	Coeffi-cient	Standard Error
Years of schooling	0.099	0.013	0.097	0.012	0.081	0.012	0.074	0.012
Experience/10	0.045	0.009	0.052	0.010	0.053	0.009	0.044	0.011
Experience/10 squared	-0.001	0.000	-0.001	0.000	-0.001	0.000	-0.001	0.000
Male	0.227	0.039	0.191	0.038	0.297	0.043	0.225	0.043
Foreigner	-0.363	0.279	-0.146	0.117	-0.473	0.239	0.024	0.133
Disabled	0.065	0.098	0.087	0.059	-0.101	0.109	0.046	0.087
Single	0.046	0.057	0.070	0.064	-0.013	0.067	-0.042	0.067
Not married	0.085	0.066	0.028	0.062	0.100	0.075	0.073	0.066
Children < 16	-0.045	0.047	-0.043	0.044	-0.112	0.045	-0.188	0.049
Capital income	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Spouse employed	0.203	0.069	0.009	0.079	0.237	0.075	0.102	0.075
Spouse not employed	0.185	0.060	0.039	0.061	0.129	0.070	0.100	0.072
Income of spouse	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Housing ownership	-0.020	0.044	0.002	0.050	-0.002	0.050	0.061	0.050
Agriculture	-0.167	0.081	-0.126	0.082	-0.013	0.076	-0.034	0.097
Mining/energy	0.005	0.126	-0.145	0.188	0.086	0.329	0.037	0.155
Construction	0.106	0.045	0.129	0.053	0.051	0.063	0.136	0.053
Trade	-0.135	0.065	-0.153	0.070	-0.167	0.069	-0.106	0.061
Transp./communic.	0.035	0.082	-0.032	0.086	-0.084	0.102	0.015	0.116
Banking/insurance	0.279	0.121	0.080	0.195	0.248	0.153	0.152	0.259
Services	-0.109	0.061	-0.114	0.064	-0.033	0.067	-0.041	0.062
Non-business organis.	0.040	0.074	0.060	0.071	0.065	0.095	0.015	0.081

Reg. Auth./soc. Secur.	0.030	0.060	0.028	0.056	0.061	0.075	0.054	0.059
Others	-0.227	0.078	-0.110	0.082	-0.110	0.125	-0.064	0.096
< 20 employee	-1.753	0.167					0.047	0.176
20-199 employees	0.117	0.041	0.162	0.043	0.080	0.045	0.247	0.042
200-1999 employees	0.134	0.053	0.246	0.059	0.207	0.072	0.324	0.067
≥2000 employees	0.247	0.075	0.364	0.065	0.285	0.082	0.314	0.065
Meckl.-Vorpommern							-0.278	0.105
Brandenburg	0.037	0.078	-0.092	0.070	0.134	0.085	-0.266	0.106
Sachsen-Anhalt	0.057	0.078	-0.028	0.070	0.070	0.083	-0.311	0.114
Thuringia	0.047	0.076	-0.035	0.068	0.164	0.080	-0.293	0.110
Saxony	0.014	0.072	-0.090	0.063	0.064	0.077	-0.345	0.107
2,000 to 20,000 citizens	0.032	0.050	0.079	0.050	0.076	0.059	0.082	0.053
20,000 to 100,000 citizens	0.072	0.055	0.062	0.060	0.088	0.066	0.156	0.057
100,000 to 500,000 citizens	0.048	0.069	0.039	0.072	0.041	0.080	0.118	0.074
More than 500,000 citizens	0.212	0.093	0.186	0.090	0.399	0.109		
Constant	-0.957	0.187	-0.821	0.192	-0.727	0.210	-0.135	0.231
Number of observations	732		690		634		626	

Notes: (i) Ordinary least squares estimation based on the year specific wave of the GSOEP. (ii) Robust standard errors using Huber/White/Sandwich estimator of variance covariance matrix (see White, 1982).

Table 40: Estimation of Income from Self-Employment for Germany Between 1984 and 1999

	West		East	
	Coeffi-cient	Standard Error	Coeffi-cient	Standard Error
Years of schooling	0.044	0.010	0.028	0.026
Experience/10	0.056	0.012	0.014	0.020
Experience/10 squared	-0.001	0.000	0.000	0.001
Tenure	-0.002	0.005		
Male	0.634	0.066	0.298	0.081
Foreigner	0.184	0.079	-0.381	0.385
Disabled	0.095	0.105	-0.168	0.392
Single	-0.100	0.089	0.085	0.114
Not married	0.091	0.105	-0.022	0.144
Children < 16	-0.111	0.057	-0.061	0.111
Capital income	0.000	0.000	0.000	0.000
Spouse employed	-0.033	0.098	-0.106	0.146
Spouse not employed	0.157	0.096	-0.124	0.160
Income of spouse	0.000	0.000	0.000	0.000
Housing ownership	-0.028	0.064	-0.089	0.102
Schleswig-Holstein	0.030	0.145		
Hamburg	0.408	0.190		
Bremen	-0.260	0.103		
Niedersachsen	0.616	0.311		
Hesse	-0.242	0.102		
Rhineland-P./Saarland	0.190	0.090		
Baden-Württemberg	0.049	0.081		
Bavaria	-0.043	0.085		
Berlin (West)	-0.776	0.191		
Meckl.-Vorpommern			0.072	0.239
Brandenburg			-0.026	0.305
Sachsen-Anhalt			-0.095	0.253
Thuringia			-0.106	0.247
Saxony			-0.171	0.214
2,000 to 5,000 citizens	-0.188	0.182	-0.060	0.119
5,000 to 20,000 citizens	0.022	0.168		
20,000 to 50,000 citizens	-0.038	0.171	0.024	0.139
50,000 to 100,000 citizens	-0.172	0.180		
100,000 to 500,000 citizens	-0.048	0.180	-0.123	0.147
More than 500,000 citizens	-0.166	0.190	0.131	0.239
GDP growth rate	-0.042	0.013	0.010	0.022
Interest rate	0.058	0.017	-0.130	0.064

Constant	-0.663	0.328	1.919	0.802
Number of observations	996		348	

Notes: (i) Ordinary least squares estimation based on waves 1-16 of the GSOEP. (ii) For different definitions of citizens see Table 36. (iii) Robust standard errors using Huber/ White/Sandwich estimator of variance covariance matrix (see White, 1982).

A.2 Tables of Chapter 6

Table 41: Sample Means of the Unemployed for the Sample-West

	Un-employed	Self-employed	Paid-employed	Inactive	Total
Process time					
1 month	9.7	17.0	17.2	6.9	10.1
2 months	8.4	16.0	14.4	4.7	8.7
3 months	7.2	10.0	13.5	6.0	7.6
4 months	6.4	8.0	8.6	4.5	6.5
5 months	5.7	4.0	7.1	5.3	5.8
6 months	5.1	7.0	6.2	6.2	5.2
7-9 months	12.3	17.0	12.5	12.7	12.3
10-12 months	9.4	5.0	6.3	17.7	9.4
13-18 months	11.4	6.0	7.6	13.2	11.2
≥19 months	24.5	10.0	6.7	22.9	23.3
Calendar period					
Prior to 86	13.5	15.0	17.9	19.7	13.9
86-88.7	16.6	10.0	19.3	16.2	16.7
88.8-94.7	33.4	27.0	30.2	35.6	33.2
After 94.8	36.5	48.0	32.7	28.6	36.1
Quarter of entry into employment status					
First quarter	37.4	26.0	32.2	36.0	37.0
Second quarter	22.8	22.0	18.5	21.5	22.5
Third quarter	20.6	24.0	24.4	23.8	20.9
Fourth quarter	19.2	28.0	24.9	18.7	19.6
Calendar quarter					
First quarter	24.4	20.0	28.2	18.4	24.6
Second quarter	23.5	24.0	22.9	14.4	23.3
Third quarter	25.1	21.0	25.4	18.5	25.0
Fourth quarter	27.0	35.0	23.5	48.7	27.2
Age < 25	18.4	12.0	34.5	25.6	19.6
25 ≤age < 29	12.8	19.0	18.5	13.1	13.2
30 ≤age < 34	9.9	26.0	14.0	9.4	10.2
35 ≤age < 39	9.3	13.0	9.9	7.4	9.3

40 ≤age < 44	7.3	15.0	8.2	5.0	7.4
45 ≤age < 49	9.4	7.0	7.3	5.5	9.2
50 ≤age < 54	11.4	4.0	4.7	6.1	10.9
55 ≤age < 67	21.4	4.0	2.7	27.9	20.3
No occupational deg.	46.1	26.0	35.0	39.4	45.2
Apprenticeship	31.2	29.0	39.1	37.4	31.8
Technical college	15.0	10.0	14.4	15.1	15.0
Master craftsman	3.2	14.0	3.6	4.0	3.3
Higher tech. college	1.1	3.0	1.8	1.4	1.1
University degree	3.5	18.0	6.2	2.8	3.7
Foreigner	42.8	16.0	30.8	32.0	41.8
Disabled	12.6	4.0	5.6	14.5	12.1
Female	44.7	32.0	38.9	58.1	44.6
Single	26.4	39.0	44.1	23.0	27.5
Married	62.1	52.0	47.9	68.2	61.3
Not married	11.5	9.0	8.0	8.8	11.3
Children < 16 years	40.2	40.0	43.1	41.8	40.4
Female * no occ. deg.	21.2	7.0	14.6	23.5	20.8
Female * apprenticeship	14.5	9.0	14.2	22.2	14.6
Female * tech. college	5.9	1.0	5.8	8.5	6.0
Female * master craft.	1.2	5.0	1.5	1.8	1.2
Female * University or hi. tech. coll. degree	1.9	10.0	2.8	2.3	2.0
Female * single	10.5	13.0	16.4	7.2	10.8
Female * not married	7.2	5.0	4.8	6.1	7.0
Female * married	27.0	14.0	17.7	44.9	26.8
Female * children < 16 years	18.1	10.0	15.2	32.7	18.2
No spouse	34.4	40.0	44.1	29.7	35.0
Spouse full-time employed	30.9	21.0	28.9	45.4	31.1
Spouse part-time employed	5.4	13.0	6.3	3.8	5.4
Spouse unemployed	6.4	7.0	4.1	5.4	6.2
Spouse out-of-labour-force	22.9	19.0	16.5	15.9	22.4
Income of spouse	1.429	1.416	1.236	2.079	1.429
	(2.11)	(2.29)	(1.99)	(3.33)	(2.14)
Household income	2.991	3.428	3.299	3.151	3.015
	(1.95)	(2.64)	(1.86)	(2.68)	(1.96)
Capital income	0.556	0.631	0.529	0.739	0.558
	(2.21)	(1.59)	(-2.39)	(2.23)	(2.23)
Housing ownership	22.6	31.0	26.0	32.0	23.1
SPIR	1.441	1.168	1.168		1.168
	(0.62)	(0.39)	(0.57)		(0.61)

IRR	0.323 (0.27)	0.220 (0.22)	0.267 (0.28)		0.267 (0.27)
Unemployment benefits	0.787 (0.67)			0.544 (0.60)	0.782 (0.67)
Father self-employed	5.1	16.0	7.6	6.9	5.3
Employment status of father missing	44.1	24.0	29.2	36.0	43.0
First job self-employed	1.7	5.0	0.7	1.7	1.6
First job white-collar	20.9	38.0	23.3	30.8	21.3
First job blue-collar	65.4	42.0	56.6	52.6	64.6
First job missing	12.1	15.0	19.4	14.9	12.6
Age at first job	1.900 (0.46)	2.030 (0.39)	1.912 (0.36)	1.916 (0.41)	1.901 (0.45)
GSOEP Sample A+E	50.8	78.0	60.4	63.6	51.7
GSOEP Sample B+D	48.1	19.0	36.9	35.4	47.0
GSOEP Sample C	1.1	3.0	2.7	1.0	1.2
Northern federal states	24.4	24.0	24.2	23.2	24.3
North-Rhine Westphalia	28.6	24.0	23.4	26.3	28.2
Middle-western federal states	16.3	22.0	16.7	19.0	16.4
Southern federal states	30.7	30.0	35.8	31.5	31.1
< 20,000 citizens	33.1	47.0	42.5	37.0	33.8
20,000 ≤citizens < 100,000	26.8	30.0	25.6	25.7	26.7
100,000 ≤citizens < 500,000	20.6	12.0	16.9	19.1	20.3
500,000 ≤citizens	19.6	11.0	15.0	18.2	19.3
Regional UV-ratio	1.874 (1.16)	1.979 (1.34)	1.876 (1.16)	2.088 (1.37)	1.879 (1.17)
Interest rate	10.444 (1.49)	10.486 (1.28)	10.290 (1.44)	10.412 (1.55)	10.434 (1.49)
GDP growth rate	2.067 (1.92)	1.921 (1.76)	2.242 (1.79)	2.083 (1.98)	2.079 (1.92)
Hard worries about economic situation	49.3	30.0	42.3	36.0	48.6
Some worries about economic situation	37.7	48.0	44.2	43.4	38.2
No worries about economic situation	13.0	22.0	13.6	20.7	13.2
Satisfaction with life	6.027 (2.26)	6.560 (2.09)	6.414 (-2.15)	6.647 (2.15)	6.065 (2.25)
Satisfaction with income	4.553 (2.65)	4.730 (2.91)	5.185 (-2.64)	5.427 (2.65)	4.610 (2.66)

Notes: (i) Statistics are the means of the exogenous variables obtained from waves 1-16 of the GSOEP. (ii) Standard deviations in parenthesis.

Table 42: Sample Means of the Self-Employed and Paid-Employed for the Sample-West

	Em-ployed	Unem-ployed	In-active	Total	Em-ployed	Unem-ployed	In active	Total
	Paid-employed				Self-employed			
Process time								
1-3 months	9.6	18.9	10.5	9.7	13.7	16.7	0.0	13.6
4-6 months	8.2	17.8	12.2	8.3	10.9	44.4	0.0	11.0
7-9 months	6.8	21.4	9.9	7.0	16.7	11.1	33.3	16.7
10-12 months	5.5	11.3	6.8	5.6	13.1	5.6	22.2	13.1
13-18 months	9.4	8.6	8.8	9.4	45.6	22.2	44.4	45.5
19-24 months	7.7	5.9	8.0	7.7				
25-30 months	6.4	3.7	6.8	6.4				
31-36 months	5.5	3.7	5.4	5.5				
37-48 months	9.1	3.2	7.1	9.0				
49-60 months	7.0	1.4	8.2	6.9				
≥61 months	24.9	4.4	16.2	24.6				
Period of entry into employment								
Prior to 86	24.5	18.8	21.3	24.4	16.2	22.2	22.2	16.2
86-88.7	27.4	20.9	27.0	27.3	25.8	22.2	11.1	25.7
88.8-94.7	30.2	34.3	35.8	30.3	35.7	16.7	66.7	35.7
After 94.8	17.9	26.0	15.9	18.0	22.4	38.9	0.0	22.4
Quarter of entry into employment status								
First quarter	29.9	26.7	26.4	29.8	39.9	22.2	44.4	39.9
Second quarter	28.5	36.6	30.7	28.7	27.5	27.8	22.2	27.5
Third quarter	21.6	19.8	23.3	21.6	19.2	27.8	22.2	19.3
Fourth quarter	20.0	16.9	19.6	19.9	13.3	22.2	11.1	13.4
Calendar quarter								
First quarter	22.8	19.3	24.2	22.8	23.4	27.8	22.2	23.5
Second quarter	24.9	16.2	16.8	24.7	24.4	22.2	33.3	24.4
Third quarter	26.0	21.4	25.9	25.9	25.7	11.1	22.2	25.6
Fourth quarter	26.4	43.1	33.2	26.6	26.5	38.9	22.2	26.6
Age < 25	19.1	27.6	27.8	19.3	4.8	16.7	0.0	4.9
25 ≤age < 29	20.5	16.8	24.7	20.5	16.1	11.1	33.3	16.1
30 ≤age < 34	17.4	14.8	13.1	17.3	24.5	16.7	11.1	24.4
35 ≤age < 39	13.9	11.2	4.8	13.8	14.0	22.2	33.3	14.1
40 ≤age < 44	9.8	8.1	10.2	9.8	13.4	5.6	22.2	13.4
45 ≤age < 49	8.2	9.0	4.3	8.2	14.2	16.7	0.0	14.2
50 ≤age < 54	6.7	7.5	4.3	6.7	6.4	5.6	0.0	6.4
55 ≤age < 67	4.4	5.1	10.8	4.4	6.5	5.6	0.0	6.5
No occ.degree	26.4	35.9	31.0	26.5	17.9	50.0	22.2	18.1
Apprenticeship	43.7	40.2	40.1	43.6	35.8	11.1	22.2	35.6
Tech. college	14.8	14.0	15.6	14.8	10.3	11.1	11.1	10.4

Master craft.	5.5	3.4	6.5	5.5	16.7	11.1	22.2	16.7
Hi. tech. coll.	2.4	1.0	1.7	2.4	2.3	5.6	0.0	2.3
University deg.	7.2	5.5	5.1	7.2	17.1	11.1	22.2	17.1
Agriculture	1.6	3.0	1.5	1.6	2.8	0.0	0.0	2.7
Mining/energy	1.1	0.7	0.4	1.1				
Manufacturing	34.7	30.2	34.6	34.6	9.8	13.3	11.1	9.8
Construction	12.4	23.2	12.7	12.5	13.8	20.0	0.0	13.8
Trade	13.9	11.2	12.7	13.8	22.2	0.0	33.3	22.1
Trans./commu.	5.2	3.8	3.9	5.1	3.0	20.0	0.0	3.1
Banking/insur.	1.9	0.5	1.5	1.9	6.8	0.0	0.0	6.8
Services	17.8	17.9	20.8	17.8	37.2	33.3	44.4	37.3
Non-business organisations	2.7	2.5	4.2	2.7	1.4	0.0	11.1	1.4
Reg. auth./ social security	4.6	4.0	3.9	4.6	2.2	0.0	0.0	2.2
Others	4.3	3.0	3.9	4.3	0.8	13.3	0.0	0.9
None employee	1.2	0.5	0.8	1.2				
< 20 employee	28.1	40.1	28.1	28.3				
20-199 empl.	31.9	34.4	36.9	31.9				
200-1999 empl.	23.9	15.9	20.8	23.8				
≥2000 empl.	14.9	9.1	13.5	14.8				
Scientists	3.2	1.6	2.3	3.2	0.9	0.0	0.0	0.9
Engineer	3.3	1.7	2.7	3.2	2.0	0.0	11.1	2.0
Physician/med. assistant	2.3	0.5	3.1	2.3	9.6	6.7	11.1	9.6
Lawyer/accountant/educator	2.4	2.1	3.5	2.4				
Past. worker/ artist/journ./author/sportsman	2.9	2.1	2.3	2.8	10.4	13.3	11.1	10.4
Manager	2.9	1.5	0.4	2.9	11.5	20.0	0.0	11.5
Bookeeper/ cashier	7.5	5.0	8.9	7.4	0.7	0.0	11.1	0.8
Other office worker/manager	8.1	5.7	8.1	8.1	0.0	6.7	0.0	0.1
Wholesale/ retail/sales	2.4	1.5	1.9	2.3	8.1	0.0	22.2	8.1
Sales staff	5.9	5.5	5.8	5.9	11.4	6.7	11.1	11.4
Restaurant trade	2.3	4.9	3.5	2.3	12.1	6.7	22.2	12.1
Domestic occu.	1.1	1.7	1.5	1.1				
Plain services	6.2	5.1	9.6	6.2	5.1	0.0	0.0	5.1
Farmer/fisherman/forestry worker	1.3	3.0	1.2	1.3	2.8	0.0	0.0	2.7
Mining/wood/ chemical worker	5.8	7.6	5.0	5.9	1.4	0.0	0.0	1.4
Textiles/foodstuff worker	3.2	1.8	2.7	3.2	3.1	0.0	0.0	3.1

Metal worker	10.6	6.5	7.3	10.6	2.9	0.0	0.0	2.9
Electrician	2.8	2.1	2.7	2.8	3.9	0.0	0.0	3.9
Painter/brick-layer/carpenter	10.6	22.9	11.9	10.7	8.8	6.7	0.0	8.8
Operator	14.7	17.0	15.0	14.7	5.4	33.3	0.0	5.5
Others	0.7	0.1	0.8	0.7				
No occupational training required	6.4	11.2	11.2	6.5	10.4	40.0	11.1	10.5
Brief training on the job required	19.1	28.2	20.8	19.2	4.4	0.0	22.2	4.4
Longer training on the job req.	16.4	17.3	13.9	16.4	10.0	33.3	22.2	10.2
Training off the job required	5.2	4.2	6.2	5.2	7.8	13.3	0.0	7.8
Occupational degree required	45.3	34.9	45.4	45.2	57.2	6.7	33.3	56.9
University or higher tech. coll. deg. required	7.6	4.2	2.7	7.5	10.2	6.7	11.1	10.2
Working in trained occupation	43.6	34.8	42.3	43.5	51.6	13.3	55.6	51.5
Not working in trained occu.	43.4	46.0	45.0	43.5	42.9	73.3	33.3	43.0
In training on the job	0.7	0.5	0.0	0.7				
No occu. degree	12.3	18.7	12.7	12.3	5.5	13.3	11.1	5.5
No info. on the current job	7.5	39.9	26.1	8.0	5.5	16.7	0.0	5.5
Foreigner	27.6	31.8	23.0	27.7	9.4	27.8	11.1	9.5
Disabled	4.9	7.3	9.1	4.9	5.1	5.6	0.0	5.1
Female	37.5	34.4	55.7	37.6	25.7	38.9	77.8	25.9
Single	34.0	38.4	31.3	34.0	29.0	44.4	22.2	29.1
Married	57.2	51.8	61.9	57.1	60.6	44.4	66.7	60.5
Not married	8.8	9.8	6.8	8.8	10.4	11.1	11.1	10.4
Children < 16 y.	41.0	42.4	43.5	41.0	41.7	44.4	22.2	41.7
Female * no occu. deg.	10.7	13.2	18.8	10.8	6.9	5.6	22.2	6.9
Female * apprenticeship	15.8	12.7	19.9	15.7	6.2	5.6	22.2	6.2
Female * technical college	6.5	4.9	10.2	6.5	0.7	0.0	0.0	0.7
Female * master craftsman	1.6	1.4	3.7	1.6	3.1	11.1	22.2	3.2
Female * higher tech. coll. deg.	0.8	0.6	0.9	0.8	2.3	5.6	0.0	2.3
Female * university degree	2.2	1.7	2.3	2.2	6.6	11.1	11.1	6.7
Female * single	13.5	13.4	14.5	13.5				

Female * not married	5.6	5.0	5.1	5.5				
Female * married	18.5	16.0	36.1	18.5	12.0	11.1	66.7	12.1
Female * children < 16 years	11.3	12.4	27.0	11.4	5.5	0.0	22.2	5.5
No spouse	35.7	41.8	31.5	35.8	33.9	55.6	22.2	33.9
Spouse full-time employed	31.8	27.7	44.9	31.8	24.1	0.0	55.6	24.0
Spouse part-time employed	10.9	7.4	6.3	10.8	22.7	16.7	0.0	22.6
Spouse unemployed	2.9	3.1	2.8	2.9	1.9	5.6	0.0	1.9
Spouse out-of-labour-force	18.8	20.1	14.5	18.8	17.4	22.2	22.2	17.5
Income of spouse	1.479 (2.52)	1.140 (1.76)	2.190 (5.72)	1.477 (2.53)	1.636 (3.15)	0.323 (0.74)	3.530 (3.30)	1.634 (3.14)
Household income	3.935 (2.09)	3.259 (2.38)	3.524 (1.76)	3.924 (2.09)	4.205 (2.79)	3.030 (2.10)	3.759 (2.39)	4.198 (2.78)
Capital income	0.639 (1.90)	0.474 (1.23)	0.530 (0.93)	0.636 (1.89)	0.942 (2.02)	0.444 (0.61)	0.556 (0.82)	0.939 (2.01)
Housing ownership	28.9	27.9	28.7	28.9	49.2	27.8	0.0	49.0
SPIR	1.379 (0.56)	1.370 (0.60)	1.454 (0.55)	1.379 (0.56)	1.196 (0.32)	1.283 (0.30)	1.572 (0.32)	1.197 (0.32)
IRR	0.300 (0.29)	0.313 (0.28)	0.291 (0.34)	0.300 (0.29)	0.268 (0.19)	0.259 (0.22)	0.245 (0.21)	0.268 (0.19)
Father self-employed	7.7	8.9	8.2	7.7	22.3	0.0	22.2	22.2
Employment status of father missing	25.8	30.8	25.0	25.9	24.0	44.4	11.1	24.1
First job self-employed	0.6	0.9	0.9	0.6				
First job white-collar	27.7	19.7	30.1	27.6	42.5	27.8	66.7	42.5
First job blue-collar	58.2	62.0	51.1	58.2	48.9	50.0	22.2	48.9
First job missing	13.5	17.4	17.9	13.6	8.6	22.2	11.1	8.6
Age at first job	1.906 (0.34)	1.891 (0.39)	1.920 (0.33)	1.906 (0.34)	2.023 (0.40)	1.872 (0.27)	2.000 (0.24)	2.022 (0.40)
GSOEP Sample A+E	65.8	60.9	67.9	65.7	85.6	66.7	66.7	85.5
GSOEP Sample B+D	31.9	36.8	28.4	32.0	14.4	33.3	33.3	14.5
GSOEP Sample C	2.3	2.3	3.7	2.3				
Northern fed. st.	21.9	24.3	23.9	22.0	19.7	22.2	0.0	19.6
North-Rhine Westphalia	26.7	21.7	24.7	26.6	23.3	38.9	44.4	23.4

Middle-western federal states	16.3	16.8	15.3	16.3	20.4	11.1	44.4	20.4
Southern fed. st.	35.1	37.2	36.1	35.2	36.6	27.8	11.1	36.5
< 20,000 citiz.	39.3	48.0	41.5	39.4	46.9	27.8	44.4	46.8
20,000 ≤citizens < 100,000	28.0	23.7	25.3	27.9	37.0	44.4	22.2	37.0
100,000 ≤citizens < 500,000	16.0	15.2	17.9	16.0	8.0	16.7	11.1	8.1
500,000 ≤citiz.	16.8	13.1	15.3	16.7	8.1	11.1	22.2	8.1
Regional	1.573	1.886	1.760	1.578	1.505	1.968	1.594	1.508
UV-ratio	(0.84)	(1.10)	(1.07)	(0.84)	(0.81)	(1.32)	(0.55)	(0.81)
Interest rate	10.641	10.437	10.634	10.638	10.730	10.583	10.328	10.728
	(1.53)	(1.50)	(1.61)	(1.53)	(1.46)	(1.36)	(0.91)	(1.46)
GDP growth	2.317	2.159	2.310	2.314	2.150	2.568	1.942	2.151
rate	(2.01)	(1.90)	(2.05)	(2.01)	(2.01)	(1.90)	(1.42)	(2.01)
Hard worries about econ. sit.	23.8	41.4	30.1	24.1	18.8	33.3	33.3	18.9
Some worries about econ. sit.	53.0	45.1	50.0	52.8	59.5	50.0	66.7	59.5
No worries about econ. sit.	23.3	13.5	19.9	23.1	21.7	16.7	0.0	21.7
Satisfaction	6.947	6.418	6.770	6.938	6.872	6.389	7.333	6.871
with life	(1.82)	(2.13)	(2.18)	(1.82)	(1.90)	(2.00)	(1.58)	(1.90)
Satisfaction	6.131	5.246	5.767	6.116	6.044	4.833	6.778	6.040
with income	(2.26)	(2.67)	(2.47)	(2.27)	(2.55)	(2.81)	(1.99)	(2.55)

Notes: (i) Statistics are the means of the exogenous variables obtained from waves 1-16 of the GSOEP. (ii) Standard deviations in parenthesis.

Table 43: Competing Risks Model for the Exit of Unemployment for the Sample-West

	Self-employment		Paid-employment		Inactivity	
	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error
Process time						
2 months	0.261	0.354	0.080	0.073	-0.105	0.200
3 months	0.134	0.405	0.311	0.077	0.380	0.189
4 months	0.168	0.437	0.123	0.087	0.279	0.205
5 months	-0.309	0.563	0.132	0.094	0.616	0.198
6 months	0.491	0.461	0.235	0.099	0.965	0.191
7-9 months	0.714	0.360	0.190	0.084	0.869	0.165
10-12 months	-0.151	0.522	-0.044	0.101	1.453	0.161
13-18 months	-0.006	0.492	0.095	0.101	1.422	0.171
≥19 months	0.319	0.434	-0.383	0.114	1.435	0.169
Calendar period						
86-88.7			-0.279	0.087	-0.340	0.121
88.8-94.7			-0.419	0.098	-0.154	0.106
After 94.8			-0.535	0.091	-0.488	0.112

Quarter of entry into employment status						
Second quarter			-0.059	0.064		
Third quarter			0.114	0.061		
Fourth quarter			0.372	0.061		
Calendar quarter						
Second quarter			-0.064	0.060	-0.189	0.119
Third quarter			0.037	0.059	-0.022	0.111
Fourth quarter			-0.160	0.059	0.805	0.094
14 ≤age < 25	-0.837	0.462	0.466	0.096	0.880	0.169
25 ≤age < 30	0.088	0.385	0.299	0.092	0.276	0.168
30 ≤age < 35	0.613	0.358	0.300	0.092	0.202	0.176
40 ≤age < 45	0.550	0.396	0.082	0.103	-0.033	0.204
45 ≤age < 50	-0.415	0.491	-0.390	0.111	-0.172	0.208
50 ≤age < 67	-1.940	0.502	-1.619	0.114	0.318	0.170
No occu. degree	0.325	0.309	-0.239	0.060	-0.093	0.097
Technical coll.	0.011	0.388	0.010	0.077	0.092	0.120
Master craftsman	1.505	0.351	-0.006	0.129	0.170	0.202
Univ. or hi. tech. coll. degree	0.666	0.365	0.269	0.097	-0.301	0.199
Foreigner			-0.249	0.092		
Disabled	-1.074	0.525	-0.469	0.097	0.211	0.115
Female	-0.436	0.295	-0.557	0.099	-0.401	0.134
Single			-0.138	0.096	-0.284	0.150
Not married			-0.236	0.140	-0.285	0.233
Children < 16 y.	0.067	0.316	-0.009	0.070	-0.699	0.139
Female * single			0.570	0.112	-0.689	0.194
Female * not married			0.756	0.181	0.088	0.287
Female * children < 16 years	-0.972	0.496	-0.458	0.101	1.329	0.169
Spouse full-time employed	-0.736	0.317	0.078	0.101		
Spouse part-time employed	0.657	0.415	0.459	0.125		
Spouse unemployed	0.152	0.463	-0.105	0.127		
Spouse out-of-labour-force	0.007	0.362	0.149	0.095		
Income of spouse			-0.031	0.020	0.025	0.014
Household inc.	0.071	0.034	0.053	0.010		
IRR	-1.956	0.510	-0.964	0.097		
Father self-emp.	0.765	0.303	0.108	0.092		

Employment status of father missing	0.251	0.308	0.090	0.065		
Housing ownership					0.215	0.088
Unemployment benefits					-0.792	0.073
First job self-employed	1.614	0.514			0.264	0.286
First job white-collar	0.630	0.273			0.250	0.099
First job missing	0.084	0.348			0.247	0.116
Age at first job	3.841	2.353			1.494	0.447
Age at first job squared	-0.742	0.514			-0.278	0.089
GSOEP Sample B+D	-1.141	0.329	-0.152	0.092	-0.525	0.096
GSOEP Sample C	0.518	0.633	0.760	0.159	-0.218	0.368
Northern fed. st.			0.145	0.071	0.047	0.107
Middle-western federal states			-0.060	0.079	0.218	0.114
Southern fed. st.			0.067	0.071	0.279	0.102
20,000 ≤citizens < 100,000	-0.014	0.248	-0.118	0.061		
100,000 ≤citizens < 500,000	-1.024	0.339	-0.255	0.070		
500,000 ≤citiz.	-0.950	0.351	-0.233	0.074		
Regional UV-ratio			-0.209	0.027		
Interest rate			-0.028	0.025		
GDP growth rate			0.033	0.013	-0.030	0.018
Some worries about econ. sit.	0.711	0.259	0.192	0.050	0.199	0.086
No worries about econ. sit.	1.189	0.340	0.041	0.074	0.339	0.115
Satisfaction with life	0.111	0.058	0.039	0.011	0.051	0.020
Satisfaction with income	-0.075	0.049	0.066	0.010	0.066	0.017
Constant	-10.760	2.647	-1.812	0.343	-7.021	0.606
μ^1		-1.354			0.262	
μ^2		1.431			0.111	
q^1		0.061			0.033	
q^2		0.171			0.038	

Log likelihood	-14,811.70
Number of obs.	48,499
Wald test	$\chi^2(157) = 2{,}569.83$

Notes: (i) FIML estimation of the multinomial logit model with non-parametrically distributed heterogeneity on the basis of Waves 1-16 of the GSOEP. (ii) Reference categories for dummy variables are: 1 month of process time, calendar period prior to 1986, first quarter of entry into employment status, first calendar quarter, 35 ≤age < 40, apprenticeship, married, no spouse, father not self-employed, first job blue-collar, GESOEP Sample A and E, North-Rhine Westphalia, citizens < 20,000, hard worries about economic situation.

Table 44: Competing Risks Model for the Exit of Unemployment for the Sample-All Neglecting Unobserved Heterogeneity

	Self-employment		Paid-employment		Inactivity	
	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error
2 months	0.261	0.299	0.028	0.059	-0.126	0.177
3 months	0.089	0.336	0.140	0.061	0.324	0.165
4 months	0.214	0.344	-0.033	0.067	0.191	0.180
5 months	-0.297	0.436	-0.098	0.072	0.498	0.173
6 months	0.416	0.363	-0.032	0.075	0.758	0.170
7-9 months	0.477	0.293	-0.150	0.060	0.677	0.145
10-12 months	0.285	0.335	-0.239	0.069	1.174	0.141
13-18 months	-0.131	0.376	-0.303	0.067	1.025	0.143
≥19 months	-0.141	0.343	-0.890	0.069	0.877	0.136
Calendar period						
86-88.7			-0.197	0.068	-0.354	0.115
88.8-94.7			-0.407	0.066	-0.176	0.097
After 94.8			-0.505	0.071	-0.427	0.102
Quarter of entry into employment status						
Second quarter			-0.052	0.046	0.039	0.084
Third quarter			0.103	0.044	0.200	0.082
Fourth quarter			0.311	0.043	0.154	0.086
Calendar quarter						
Second quarter	0.190	0.240	-0.148	0.047	-0.328	0.100
Third quarter	0.074	0.242	-0.046	0.045	-0.065	0.091
Fourth quarter	0.455	0.217	-0.312	0.046	0.556	0.079
14 ≤age < 25	-0.805	0.381	0.338	0.066	1.015	0.141
25 ≤age < 30	-0.081	0.292	0.187	0.062	0.455	0.138
30 ≤age < 35	0.304	0.256	0.151	0.061	0.174	0.145
40 ≤age < 45	0.064	0.285	-0.066	0.067	0.054	0.166
45 ≤age < 50	-0.403	0.331	-0.271	0.072	-0.022	0.172
50 ≤age < 67	-1.832	0.377	-1.119	0.072	0.588	0.136
No occu.degree	0.396	0.318	-0.242	0.045	-0.138	0.115
Technical college	0.194	0.362	-0.017	0.053	0.030	0.146
Master craftsman	1.489	0.319	0.070	0.071	0.452	0.190

University or hi. tech. coll. degree	0.675	0.344	0.178	0.068	-0.755	0.251
Foreigner			-0.236	0.074		
Disabled	-1.049	0.464	-0.444	0.073	0.217	0.094
Female	-0.522	0.399	-0.502	0.064	-0.541	0.133
Single	-0.173	0.337	-0.213	0.067	-0.287	0.126
Not married	-0.418	0.455	-0.254	0.093	-0.268	0.187
Children < 16 y.	0.280	0.254	0.008	0.049	-0.653	0.119
Female * no occupational deg.	-0.644	0.530			0.210	0.143
Female * technical college	-1.130	0.822			0.136	0.193
Female * master craftsman	-0.290	0.480			-0.289	0.263
Female * univ./hi. tech. coll. deg.	0.473	0.457			1.025	0.315
Female * single	0.636	0.414	0.497	0.074	-0.562	0.158
Female * not married	0.951	0.593	0.521	0.120	0.170	0.228
Female * children < 16 years	-0.892	0.368	-0.297	0.068	1.239	0.141
Spouse full-time employed			-0.029	0.014	0.023	0.013
Spouse part-time employed	-0.163	0.280	0.088	0.071		
Spouse unem-ployed	0.677	0.366	0.282	0.091		
Spouse out-of-labour-force	0.215	0.381	-0.149	0.083		
Income of spouse	0.031	0.337	0.061	0.067		
Household income	0.066	0.031	0.049	0.008		
SPIR	-0.382	0.220	-0.071	0.037		
IRR	-2.376	0.417	-1.163	0.070		
Unemployment benefits					-0.813	0.058
Father self-employed	0.607	0.260	0.134	0.066		
Employment status of father missing	0.239	0.221	0.032	0.043		
First job self-employed	1.061	0.500	-0.448	0.199	-0.033	0.253
First job white-collar	0.517	0.211	0.026	0.043	0.241	0.078
First job missing	0.155	0.289	0.055	0.049	0.204	0.096
Age at first job	3.118	2.088			1.073	0.361
Age at first job squared	-0.612	0.462			-0.194	0.071
GSOEP Sample B+D	-1.112	0.300	-0.086	0.073	-0.490	0.081
GSOEP Sample C	0.233	0.224	0.545	0.090	-0.024	0.166

Northern fed. st.			0.118	0.059	0.021	0.103
Middle-western federal states			0.008	0.064	0.201	0.102
Southern fed. st.			0.156	0.055	0.234	0.091
North-east. fed. st.			0.087	0.090	-0.083	0.158
South-east. fed. st.			-0.047	0.100	0.023	0.191
20,000 ≤citizens < 100,000	-0.061	0.205	-0.088	0.041		
100,000 ≤citizens < 500,000	-0.571	0.248	-0.203	0.047		
500,000 ≤citizens	-0.401	0.258	-0.126	0.055		
Regional UV-ratio			-0.143	0.016		
GDP growth rate	0.045	0.030	0.021	0.007	-0.030	0.013
Some worries about econ. sit.	0.353	0.188	0.154	0.036	0.269	0.071
No worries about economic sit.	0.683	0.268	0.023	0.059	0.488	0.098
Satisfac. with life	0.142	0.044	0.031	0.008	0.032	0.017
Satisfaction with income			0.056	0.007	0.056	0.014
Constant	-9.845	2.374	-1.536	0.152	-6.061	0.496
Hausman/Small-Hsiao test	χ^2 (58) = 0.91		χ^2 (67) = 77.21		χ^2 (60) = 9.52	
Number of observations			70,555			
Log likelihood			-22,058.104			
Likelihood ratio test			χ^2(182) = 4,804.99			

Notes: (i) FIML estimation of the multinomial logit model with non-parametrically distributed heterogeneity on the basis of Waves 1-16 of the GSOEP. (ii) Reference categories for dummy variables are: 1 month of process time, calendar period prior to 1986, first quarter of entry into employment status, first calendar quarter, 35 ≤age < 40, apprenticeship, married, no spouse, father not self-employed, first job blue-collar, GESOEP Sample A and E, North-Rhine Westphalia, citizens < 20,000, hard worries about economic situation. (iii) The Hausman test for the state of paid-employment yielded a negative test statistic; the reported statistic refers to the Small-Hsiao test.

Table 45: Competing Risks Model for the Exit of Unemployment for the Sample-West Neglecting Unobserved Heterogeneity

	Self-employment		Paid-employment		Inactivity	
	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error
Process time						
2 months	0.170	0.353	-0.002	0.070	-0.191	0.198
3 months	-0.043	0.403	0.147	0.072	0.219	0.186
4 months	-0.062	0.435	-0.094	0.081	0.072	0.202
5 months	-0.592	0.561	-0.141	0.087	0.363	0.194
6 months	0.176	0.458	-0.084	0.091	0.670	0.187

7-9 months	0.341	0.356	-0.174	0.073	0.517	0.159
10-12 months	-0.579	0.519	-0.472	0.090	1.030	0.153
13-18 months	-0.503	0.487	-0.423	0.085	0.905	0.160
≥19 months	-0.407	0.426	-1.080	0.089	-0.734	0.152
Calendar period						
86-88.7			-0.235	0.081	-0.345	0.115
88.8-94.7			-0.333	0.090	-0.163	0.099
After 94.8			-0.435	0.081	-0.461	0.106
Quarter of entry into employment status						
Second quarter			-0.050	0.058		
Third quarter			0.129	0.055		
Fourth quarter			0.368	0.054		
Calendar quarter						
Second quarter			-0.114	0.058	-0.238	0.118
Third quarter			-0.028	0.057	-0.067	0.110
Fourth quarter			-0.221	0.056	0.774	0.093
14 ≤age < 25	-0.879	0.456	0.414	0.081	0.825	0.157
25 ≤age < 30	0.046	0.381	0.267	0.078	0.244	0.158
30 ≤age < 35	0.532	0.354	0.262	0.080	0.170	0.166
40 ≤age < 45	0.497	0.390	0.070	0.090	-0.056	0.195
45 ≤age < 50	-0.345	0.486	-0.281	0.094	-0.154	0.196
50 ≤age < 67	-1.780	0.495	-1.441	0.098	-0.415	0.156
No occu.degree	0.312	0.306	-0.224	0.049	-0.055	0.088
Technical college	-0.066	0.381	-0.020	0.063	0.041	0.108
Master craftsman	1.430	0.344	-0.053	0.108	0.181	0.183
University or hi. tech. coll. degree	0.642	0.359	0.244	0.082	-0.372	0.184
Foreigner			-0.230	0.077		
Disabled	-0.989	0.521	-0.418	0.083	0.227	0.103
Female	-0.414	0.292	-0.522	0.085	-0.345	0.123
Single			-0.159	0.083	-0.338	0.142
Not married			-0.195	0.120	-0.244	0.217
Children < 16 y.	0.078	0.312	0.000	0.059	-0.698	0.132
Female * single			0.536	0.095	-0.681	0.182
Female * not married			0.731	0.155	0.028	0.265
Female * children < 16 years	-0.905	0.491	-0.408	0.087	1.364	0.158
Spouse full-time employed			-0.037	0.018	0.023	0.013
Spouse part-time employed	-0.648	0.315	0.128	0.090		
Spouse unempl.	0.697	0.408	0.461	0.108		

Spouse out-of-labour-force	0.251	0.457	-0.059	0.112		
Income of spouse	0.078	0.357	0.169	0.083		
Household income	0.062	0.035	0.048	0.009		
IRR					0.204	0.081
Father self-employed	-1.757	0.510	-0.735	0.085		
Empl. status of father missing					-0.651	0.068
Housing ownership	0.789	0.298	0.152	0.076		
Unemployment benefits	0.163	0.300	0.062	0.053		
First job self-employed	1.553	0.504			0.249	0.262
First job white-collar	0.581	0.268			0.254	0.090
First job missing	0.029	0.344			0.248	0.110
Age at first job	3.919	2.316			1.214	0.387
Age at first job squared	-0.758	0.506			-0.220	0.076
GSOEP Sample B+D	-1.002	0.321	-0.079	0.076	-0.413	0.088
GSOEP Sample C	0.478	0.625	0.698	0.132	-0.234	0.351
Northern fed. st.			0.097	0.058	0.009	0.098
Middle-western federal states			-0.071	0.066	0.185	0.103
Southern fed. st.			0.083	0.059	0.229	0.093
20,000 ≤citizens < 100,000	-0.068	0.245	-0.151	0.051		
100,000 ≤citizens < 500,000	-0.988	0.335	-0.249	0.059		
500,000 ≤citizens	-0.937	0.347	-0.222	0.062		
Regional UV-ratio			-0.179	0.026		
Interest rate			-0.037	0.023		
GDP growth rate			0.029	0.012	-0.030	0.017
Some worries about econ. sit.	0.691	0.256	0.188	0.045	0.168	0.083
No worries about econ. sit.	1.139	0.336	0.029	0.067	0.311	0.109
Satisfac. with life	0.102	0.057	0.033	0.010	0.041	0.019
Satisfaction with income	-0.081	0.048	0.060	0.009	0.060	0.016
Constant	-10.379	2.591	-1.406	0.304	-6.249	0.528
Hausman test	χ^2 (46) = 2.31		χ^2 (68) = 26.48		χ^2 (52) = 3.61	
Number of observations			48,499			

Log likelihood	-14,889.447
Likelihood ratio test	$\chi^2(157) = 3,829.47$

Notes: (i) FIML estimation of the multinomial logit model with non-parametrically distributed heterogeneity on the basis of Waves 1-16 of the GSOEP. (ii) Reference categories for dummy variables are: 1 month of process time, calendar period prior to 1986, first quarter of entry into employment status, first calendar quarter, 35 ≤age < 40, apprenticeship, married, no spouse, father not self-employed, first job blue-collar, GESOEP Sample A and E, North-Rhine Westphalia, citizens < 20,000, hard worries about economic situation.

Table 46: Hazard Rate Model for the Exit of Employment for the Sample-West

	Paid-employed		Self-employed	
	Coefficient	Standard Error	Coefficient	Standard Error
Process time				
4-6 months	0.378	0.093	1.994	0.809
7-9 months	0.885	0.097	1.899	0.932
10-12 months	0.821	0.115	1.982	1.052
13-18 months	0.342	0.122	2.340	1.054
19-24 months	0.317	0.137		
25-30 months	0.259	0.154		
31-36 months	0.375	0.160		
37-48 months	-0.043	0.163		
49-60 months	-0.030	0.186		
≥61 months	-0.225	0.160		
Period of entry into employment				
86-88.7	0.106	0.100	-2.330	1.026
88.8-94.7	0.373	0.101	-2.804	1.283
After 94.8	0.115	0.111	-2.048	1.305
Quarter of entry into employment status				
Second quarter	0.242	0.075		
Third quarter	0.115	0.085		
Fourth quarter	0.133	0.090		
Calendar quarter				
Second quarter	-0.327	0.090		
Third quarter	-0.197	0.081		
Fourth quarter	0.372	0.071		
14 ≤age < 25	0.412	0.120	-1.673	1.178
25 ≤age < 30	0.193	0.112	-3.552	1.265
30 ≤age < 35	0.178	0.113	-2.542	1.055
40 ≤age < 45	0.165	0.128	-2.536	0.919
45 ≤age < 50	0.145	0.134		
50 ≤age < 55	0.256	0.144		
55 ≤age < 67	0.547	0.150		
45 ≤age < 69			-1.921	0.869

20-199 employees	-0.120	0.085		
200-1999 employees	-0.405	0.106		
≥2000 employees	-0.348	0.128		
Scientists	-0.712	0.293		
Engineer	-0.702	0.271		
Physician/medical assistant	-1.097	0.325		
Lawyer/accountant/educator	-0.273	0.271		
Past. worker/artist/journ./author/sportsman	-0.552	0.268		
Manager	-0.925	0.334		
Bookkeeper/cashier	-0.662	0.178		
Other office worker/manager	-0.676	0.174		
Wholesale/retail/sales	-0.643	0.290		
Sales staff	-0.731	0.175		
Restaurant trade	-0.297	0.197		
Domestic occupation	-0.610	0.302		
Plain services	-0.818	0.170		
Farmer/fisherman/forestry worker	-0.012	0.243		
Mining/wood/chemical worker	-0.368	0.161		
Textiles/foodstuff worker	-0.889	0.254		
Metal worker	-0.758	0.159		
Electrician	-0.746	0.250		
Operator, others	-0.458	0.124		
No occupational degree			1.245	1.087
Technical college/master craftsman			1.829	0.961
Univ. or hi. tech. coll. degree			2.076	1.163
Brief training on the job required	-0.114	0.128		
Longer training on the job required	-0.348	0.143		
Training off the job required	-0.275	0.198		
Occupational degree required	-0.539	0.132		
Univ. or hi. tech. coll. degree required	-0.565	0.250		
Brief training on the job/training off the job required			-1.751	0.968
Occupational/univ. or hi. tech. coll. degree required			-3.566	1.090
No information on the current job	0.603	0.155	-0.511	1.260
Disabled	0.343	0.114		
Female	0.332	0.100	1.881	1.161
Single	0.055	0.095		
Married			-2.892	1.307
Not married	0.125	0.160		
Female * single	-0.442	0.138		
Female * married			2.053	1.317
Female * not married	-0.492	0.218		
Spouse income	0.020	0.009	0.306	0.198
Spouse full-time employed			-1.680	1.546

Spouse part-time employed			0.923	1.499
Spouse out-of-labour-force			1.734	1.103
Household income	-0.088	0.020	-0.276	0.153
Housing ownership			-2.697	0.992
SPIR			2.179	1.690
IRR	0.253	0.099	3.900	1.682
First job self-employed	0.489	0.337		
First job white-collar	0.106	0.087	-2.374	0.859
First job blue-collar	0.320	0.091	0.179	0.883
Northern federal states	0.109	0.092	-1.443	1.346
Middle-western federal states	0.084	0.103	0.979	0.842
Southern federal states	0.263	0.090	1.215	1.008
20,000 $\leq$citizens < 100,000	-0.189	0.079		
100,000 $\leq$citizens < 500,000	-0.128	0.093		
500,000 $\leq$citizens	-0.248	0.099		
Regional UV-ratio	0.168	0.034		
GDP growth rate	-0.027	0.015	0.236	0.150
Some worries about economic situation	-0.178	0.065		
No worries about economic situation	-0.247	0.094		
Satisfaction with life	-0.033	0.016		
Satisfaction with income	-0.038	0.014		
Constant	-2.983	0.320	-4.551	2.821
μ^1	-1.043	0.112		
q^1	0.701	0.110		
Number of observations	83,446			
Log likelihood	-6,945.351			
Likelihood ratio test	$\chi^2(78) = 1{,}670.70$			

Notes: (i) FIML estimation of the binomial logit model with non-parametrically distributed heterogeneity on the basis of Waves 1-16 of the GSOEP. (ii) Reference categories for dummy variables are: 1 to 3 months of process time for the paid-employment model and 1 to 6 months for the self-employment model, period of entry into employment status prior to 1986, first quarter of entry into employment status, first calendar quarter, 35 $\leq$age < 40, apprenticeship, manufacturing for the paid-employment model and manufacturing and construction for the self-employment model, less then 20 employees, electrician, no training required, no occupational degree required, married, no spouse, father not self-employed, first job blue-collar, GESOEP Sample A and E, North-Rhine Westphalia, citizens < 20,000, hard worries about economic situation. (iii) For the self-employment model the categories 7 to 9 months and 10 to 12 months of process time, 19 to 24 months and 25 to 36 months of process time, 37 to 48 months, 49 to 60 months and 61 months and more of process time; 40 $\leq$age < 45 and 45 $\leq$age < 50, 50 $\leq$age < 55 and 55 $\leq$age < 67; trade, transportation/communication; banking/insurance and service, agriculture, mining/energy, nonbusiness organisations, regional authorities/social security and others; brief training on the job, longer training on the job and training off the job required, Occupational degree and university or higher technical college degree required are combined.

Table 47: Estimation of the Fixed-Effects for the Sample-All

	Paid-employed		Self-employed	
	Coeffi-cient	Standard Error	Coeffi-cient	Standard Error
Period of entry into employment				
86-88.7	0.012	0.004	-0.273	0.170
88.8-94.7	-0.053	0.004	-1.041	0.152
After 94.8	-0.094	0.005	-0.341	0.175
Quarter of entry into employment status				
Second quarter	-0.031	0.004	-0.537	0.084
Third quarter	0.011	0.004	1.014	0.105
Fourth quarter	-0.020	0.004	0.208	0.101
No occupational degree			0.337	0.165
Technical college			-1.125	0.130
Master craftsman			0.866	0.113
Higher technical college			2.751	0.626
University degree			1.439	0.161
Foreigner			0.438	0.333
Female	-0.430	0.003	0.399	0.122
Female * no occupational degree			-0.524	0.238
Female * technical college			0.978	0.323
Female * master craftsman			-1.146	0.195
Female * higher technical college			-3.462	0.707
Female * university degree			-1.357	0.204
SPIR	-0.080	0.003	0.695	0.119
IRR	0.232	0.005	0.467	0.215
Father self-employed	0.042	0.005	0.430	0.104
Employment status of father missing	0.081	0.004	0.710	0.093
First job self-employed	0.003	0.018	0.500	0.199
First job white-collar	0.025	0.004	0.638	0.098
First job missing	-0.057	0.004	-2.080	0.128
Age at first job	-0.431	0.021	5.333	0.947
Age at first job squared	0.102	0.005	-1.323	0.210
GSOEP Sample B+D	0.163	0.004	0.425	0.271
GSOEP Sample C	-0.092	0.004	-2.188	0.234
Northern federal states			-1.207	0.143
Middle-western federal states			1.053	0.131
Southern federal states			0.046	0.118
North-eastern federal states			1.928	0.254
South-eastern federal states			1.184	0.258
Constant	0.663	0.025	-6.036	1.095
σ	0.434		1.978	
Number of observations	104,113		4,910	
R^2	0.290		0.289	
F-test	F(18, 104,094) = 2,360.03		F(34, 4,875) = 58.14	

Notes: (i) Ordinary least squares estimation on the basis of Waves 1-16 of the GSOEP. (ii) Reference categories for dummy variables are prior to 86, first quarter, apprenticeship, female * apprenticeship, father not self-employed, first job blue collar, GSOEP Sample A+E, North-Rhine Westphalia.

Table 48: Fixed-Effects Income Estimation for the Self- and Paid-Employed for the Sample-West

	Paid-employed		Self-employed	
	Coeffi-cient	Standard Error	Coeffi-cient	Standard Error
Process time	0.008	2.69E-04	0.014	0.003
Process time squared	-0.00006	0.000004	-0.000118	0.000039
Process time to the power of 3	2.24E-07	1.89E-08	2.86E-07	1.66E-07
Quarter of entry into employment status				
Second quarter	-0.009	0.004	-0.034	0.033
Third quarter	-0.017	0.004	-0.028	0.031
Fourth quarter	-0.047	0.004	-0.094	0.031
14 ≤age < 25	-0.024	0.012	-0.112	0.147
25 ≤age < 30	-0.010	0.009	0.160	0.106
30 ≤age < 35	-0.010	0.007	0.024	0.070
40 ≤age < 45	-0.033	0.008	0.070	0.091
45 ≤age < 50	-0.088	0.012	-0.083	0.124
50 ≤age < 55	-0.195	0.015	-0.295	0.162
55 ≤age < 67	-0.326	0.019	-0.243	0.204
No occupational degree	-0.573	0.026		
Technical college	-0.079	0.040		
Master craftsman	0.262	0.026		
Higher technical college	0.115	0.091		
University degree	-0.242	0.103		
Agriculture	-0.554	0.046		
Mining/energy/construction	-0.049	0.029		
Construction	-0.008	0.013		
Trade	-0.009	0.012	-0.399	0.249
Transportation/communication	0.022	0.015	0.549	0.802
Banking/insurance	0.135	0.035	1.608	0.455
Services	0.092	0.014	3.973	0.469
Non-business organisations	-0.011	0.023		
Regional authorities/social security	-0.040	0.018		
Others	0.045	0.015	4.040	0.324
20-199 employees	-0.001	0.008		
200-1999 employees	0.033	0.010		
≥2000 employees	0.079	0.012		
Scientists	0.061	0.025	-1.474	0.328
Engineer	0.062	0.024		
Physician/medical assistant	0.283	0.037		

Lawyer/accountant/educator	-0.200	0.039		
Past. worker/artist/journ./author/sportsman	0.193	0.027		
Manager	0.010	0.023	2.393	0.465
Bookkeeper/cashier	-0.013	0.019		
Other office worker/manager	0.076	0.019		
Wholesale/retail/sales	0.224	0.027	0.483	0.513
Sales staff	0.060	0.020	1.457	0.471
Restaurant trade	-0.211	0.030		
Domestic occupation	0.073	0.032	3.464	0.505
Plain services	0.052	0.020		
Farmer/fisherman/forestry worker	0.193	0.040		
Mining/wood/chemical worker	-0.114	0.019	2.788	0.541
Textiles/foodstuff worker	-0.118	0.028		
Metal worker	-0.033	0.016		
Electrician	0.017	0.027		
Operator	0.027	0.014		
Others	0.280	0.053		
Brief training on the job required	0.042	0.013	3.280	0.511
Longer training on the job required	0.100	0.014	-0.939	0.271
Training off the job required	-0.006	0.017	2.253	0.305
Occupational degree required	0.078	0.014	3.727	0.424
Univ. or hi. tech. coll. degree required	0.242	0.025	0.233	0.449
Not working in trained occupation	-0.040	0.009	0.611	0.160
In training on the job	-0.541	0.043	0.101	0.337
No occupational degree	-0.097	0.015		
No information on the current job	-0.170	0.021	6.339	0.728
Foreigner	-0.027	0.026		
Disabled	-0.060	0.012	-0.196	0.223
Single	0.006	0.010	0.146	0.103
Not married	0.062	0.016	0.061	0.227
Children < 16 years	0.019	0.007	0.086	0.064
Female * no occupational degree	0.330	0.038		
Female * technical college	0.129	0.054		
Female * master craftsman	-0.445	0.078		
Female * higher technical college	-0.222	0.136		
Female * university degree	0.004	0.243		
Female * single	0.004	0.017	-0.390	0.282
Female * not married	-0.037	0.022	0.277	0.296
Female * children < 16 years	-0.050	0.012	0.071	0.157
Spouse full-time employed	0.033	0.008	-0.125	0.119
Spouse part-time employed	0.036	0.010	-0.094	0.130
Spouse out-of-labour-force	0.023	0.012	-0.342	0.158
Spouse income	0.002	0.001	0.004	0.018
Spouse inactive	0.033	0.009	-0.472	0.120
Household interest	0.002	0.001	0.117	0.009

Housing ownership	-0.001	0.007	-0.027	0.058
Northern federal states	0.153	0.039		
Middle-western federal states	-0.030	0.042		
Southern federal states	0.108	0.037		
20,000 ≤citizens < 100,000	0.027	0.010	0.410	0.138
100,000 ≤citizens < 500,000	0.015	0.015	0.438	0.194
500,000 ≤citizens	0.110	0.020	0.049	0.233
Regional UV-ratio	-0.008	0.002	-0.083	0.021
Interest rate	0.002	0.001	-0.064	0.012
GDP growth rate	0.002	0.001	0.003	0.007
Some worries about economic situation	0.005	0.004	-0.094	0.042
No worries about economic situation	0.014	0.005	-0.205	0.056
Satisfaction with life	0.006	0.001	0.006	0.010
Constant	0.770	0.039	-3.778	0.635
σ_u	0.749		3.127	
σ_ε	0.361		0.602	
ρ	0.812		0.964	
Number of observations	80,334		3,247	
R^2-within	0.118		0.287	
R^2-between	0.080		0.009	
R^2-overall	0.088		0.004	
F-test that all fixed effects are 0	F(1,946, 78,295) = 41.76		F(55, 3,107) = 22.77	

Notes: (i) Fixed effects estimation on the basis of Waves 1-16 of the GSOEP. (ii) Reference categories for dummy variables are: first calendar quarter, 35 ≤age < 40, apprenticeship, manufacturing for the paid-employment model and manufacturing and construction for the self-employment model, less then 20 employees, painter/bricklayer/carpenter, no training required, no occupational degree required, married, no spouse, North-Rhine Westphalia, citizens < 20,000, hard worries about economic situation. (iii) For the self-employment model the categories agriculture, mining/energy, non-business organisations, regional authorities/social security and others; in training on the job and no occupational degree; scientists, engineer, physician/medical assistant, pastoral worker/artist/journalist/author/ sportsman and lawyer/accountant/educator, bookkeeper/cashier and domestic occupation, plain services, farmer/fisherman/forestry worker, operator, others and mining/wood/ chemical worker, textiles/foodstuff worker, metal worker, electrician are combined. (iv) For the self-employment model the age category is 55 ≤age < 69. (v) Missing groups of variables for the self-employment model are due to time-invariance.

Table 49: Estimation of the Fixed-Effects for the Sample-West

	Paid-employed		Self-employed	
	Coefficient	Standard Error	Coefficient	Standard Error
Period of entry into employment				
86-88.7	0.028	0.004	-2.763	0.225
88.8-94.7	-0.024	0.004	-2.376	0.202
After 94.8	-0.078	0.005	-1.457	0.294

Quarter of entry into employment status				
Second quarter	-0.044	0.004	-2.539	0.159
Third quarter	0.023	0.005	-0.204	0.176
Fourth quarter	-0.012	0.005	-0.324	0.178
No occupational degree			0.895	0.241
Technical college			-1.105	0.197
Master craftsman			1.854	0.201
Higher technical college			-0.424	0.423
University degree			0.313	0.305
Foreigner			-5.027	0.470
Female	-0.493	0.004	-0.984	0.338
Female * no occupational degree			-0.130	0.384
Female * technical college			-0.553	0.615
Female * master craftsman			-2.062	0.427
Female * university degree			2.504	0.383
SPIR	-0.026	0.003	3.514	0.271
IRR	0.212	0.006	4.167	0.376
Father self-employed	0.052	0.006	-1.060	0.166
Employment status of father missing	0.086	0.004	-1.118	0.177
First job self-employed	-0.037	0.021	-2.921	0.263
First job white-collar	-0.014	0.004	-0.632	0.192
First job missing	-0.068	0.005	-1.987	0.250
Age at first job	-0.623	0.024	-6.304	1.418
Age at first job squared	0.145	0.005	1.832	0.316
GSOEP Sample B+D	0.137	0.004	4.890	0.375
GSOEP Sample C	-0.106	0.011	-3.643	0.320
Northern federal states			1.103	0.181
Middle-western federal states			0.909	0.175
Southern federal states			0.926	0.163
Constant	0.769	0.028	2.386	1.687
σ	0.446		2.376	
Number of observations	80,334		3,247	
R^2	0.292		0.348	
F-test	F(18, 80,315) = 1,840.16		F(31, 3,215) = 55.24	

Notes: (i) Ordinary least squares estimation on the basis of Waves 1-16 of the GSOEP. (ii) Reference categories for dummy variables are prior to 86, first quarter, apprenticeship, female * apprenticeship, father not self-employed, first job blue collar, GSOEP Sample A+E, North-Rhine Westphalia.

Table 50: Distribution of the DEI for the Sample-West

	Self-employed	Paid-employed (max)
5%-Percentile	-2537.81	-32022.70
25%-Percentile	-667.79	-3115.80
50%-Percentile	612.06	1612.78
75%-Percentile	1981.66	3076.32
95%-Percentile	5409.08	5155.26
Mean	941.34	-2799.77
Standard Deviation	2987.09	11301.80

Note: Figures are based on the estimated DEI obtained by the fixed effects estimations in Table 48 and the estimation of the fixed effects in Table 49.

A.3 Figures of Chapter 6

Figure 25: Survival in Employment Among the Initially Self-Employed (Sample-West)

Notes: (i) Simulations for the sample means of the initially paid-employed based on the estimates reported in Table 46.

Figure 26: Survival in Employment Among the Initially Paid-Employed (Sample-West)

Notes: (i) Simulations for the sample means of the initially paid-employed based on the estimates reported in Table 46.

Figure 27: Kernel Density Estimation of the DEI for the 90%-Sample of the Initially Paid-Employed

Note: Kernel Density Estimation is based on the estimated DEI obtained by the fixed effects estimations reported in Table 13.

Figure 28: Kernel Density Estimation of the DEI for the 95%-Sample of the Initially Paid-Employed

Note: Kernel Density Estimation is based on the estimated DEI obtained by the fixed effects estimations reported in Table 13.

Figure 29: Kernel Density Estimation of the DEI for the 99%-Sample of the Initially Paid-Employed

Note: Kernel Density Estimation is based on the estimated DEI obtained by the fixed effects estimations reported in Table 13.

A.4 Tables of Chapter 8

Table 51: Subsidisation Equation of One-Year Firm Survival in East Germany

Subsidisation equation	Coefficient	Standard Error	Marginal Effect	Mean
U/V-ratio	-0.012	0.011	0.0000002	3.338
Age of firm at first observation/100	-0.012	0.010	0.0000002	3.291
Initial firm size	-0.057	0.011	0.0000008	3.434
Non-corporate firm	0.185	0.117		
Trade enterprise/sole proprietorship	0.217	0.137		
Manufacturing	0.085	0.109		
Wholesale trade	0.153	0.115		
Retail trade	0.013	0.084		
Hospitality	-0.200	0.125		
Communication/transportation	-0.058	0.136		
Finance/insurance/real estates/housing	-0.292	0.132		
Business rel. serv. incl. data processing	0.011	0.113		

Other services	-0.220	0.122		
One additional shareholder	0.431	0.158	-0.0000129	0.171
Two additional shareholders	0.639	0.188	-0.0000409	0.036
Three and more additional shareholders	0.551	0.315	-0.0000299	0.009
Quarter 93/4	-0.578	0.125	0.0000039	0.111
Quarter 94/1	-0.454	0.104	0.0000037	0.150
Quarter 94/2	-0.593	0.109	0.0000045	0.164
Quarter 94/3	-0.348	0.109	0.0000030	0.117
Quarter 95/1	-0.092	0.091	0.0000012	0.141
Quarter 95/2	-0.619	0.117	0.0000044	0.146
Quarter 95/3	-1.334	0.227	0.0000044	0.058
Constant	-1.057	0.160		

Notes: (i) See notes of Table 22. (ii) Reference categories for dummy variables are: corporate firm, construction, no additional shareholder, quarter 94/4.

Table 52: Subsidisation Equation of Two-Year Firm Survival in East Germany

Subsidisation equation	Coeffi-cient	Standard Error	Marginal Effect	Mean
Initial Firm Size	-0.062	0.011	0.001	3.531
Manufacturing	0.043	0.115		
Wholesale trade	0.167	0.119		
Retail trade	0.045	0.087		
Hospitality	-0.249	0.133		
Communication/transportation	-0.088	0.150		
Finance/insurance/real estates/housing	-0.385	0.144		
Business rel. serv. incl. data processing	0.016	0.118		
Other services	-0.237	0.127		
One additional shareholder	0.378	0.075	-0.005	0.175
Two additional shareholders	0.503	0.146	-0.007	0.038
Three and more additional shareholders	0.426	0.297	-0.006	0.009
Quarter 93/4	-0.615	0.123	0.009	0.113
Quarter 94/1	-0.506	0.120	0.007	0.152
Quarter 94/2	-0.670	0.111	0.009	0.166
Quarter 94/3	-0.324	0.109	0.005	0.116
Quarter 95/1	-0.072	0.102	0.001	0.142
Quarter 95/2	-0.655	0.113	0.009	0.141
Quarter 95/3	-1.438	0.267	0.019	0.057
Constant	-0.897	0.099		

Notes: (i) See notes of Table 23. (ii) Reference categories for dummy variables are: construction, no additional shareholder, quarter 94/4.

Table 53: Subsidisation Equation of Three-Year Firm Survival in East Germany

Subsidisation equation	Coeffi-cient	Standard Error	Marginal Effect	Mean
Age of firm at first observation/100				
Initial firm size	-0.065	0.011	0.00005	3.624
Manufacturing	0.020	0.118		
Wholesale trade	0.171	0.122		
Retail trade	0.031	0.090		
Hospitality	-0.314	0.143		
Communication/transportation	-0.083	0.149		
Finance/insurance/real estates/housing	-0.389	0.154		
Business rel. serv. incl. data processing	0.004	0.125		
Other services	-0.243	0.134		
One additional shareholder	0.390	0.077	-0.00027	0.181
Two additional shareholders	0.533	0.152	-0.00037	0.039
Three and more additional shareholders	0.460	0.307	-0.00032	0.010
Quarter 93/4	-0.628	0.135	0.00046	0.114
Quarter 94/1	-0.491	0.137	0.00035	0.154
Quarter 94/2	-0.662	0.131	0.00048	0.164
Quarter 94/3	-0.287	0.115	0.00021	0.113
Quarter 95/1	-0.048	0.125	0.00003	0.143
Quarter 95/2	-0.627	0.118	0.00045	0.141
Quarter 95/3	-1.417	0.273	0.00105	0.058
Constant	-0.900	0.105		

Notes: (i) See notes of Table 24. (ii) Reference categories for dummy variables are: construction, no additional shareholder, quarter 94/4.

Table 54: Subsidisation Equation of Four-Year Firm Survival in East Germany

Subsidisation equation	Coeffi-cient	Standard Error	Marginal Effect	Mean
U/V-ratio				
Age of firm at first observation/100	-0.019	0.011	0.001	3.092
Initial firm size	-0.068	0.012	0.004	3.687
Manufacturing	0.120	0.122		
Wholesale trade	0.197	0.128		
Retail trade	0.061	0.091		
Hospitality	-0.312	0.148		
Communication/transportation	0.018	0.153		
Finance/insurance/real estates/housing	-0.302	0.162		
Business rel. serv. incl. data processing	0.097	0.132		
Other services	-0.146	0.146		
One additional shareholder	0.393	0.078	-0.025	0.181

Two additional shareholders	0.517	0.153	-0.036	0.039
Three and more additional shareholders	0.485	0.293	-0.033	0.010
Quarter 93/4	-0.638	0.130	0.029	0.118
Quarter 94/1	-0.554	0.120	0.026	0.161
Quarter 94/2	-0.663	0.118	0.031	0.168
Quarter 94/3	-0.256	0.117	0.013	0.116
Quarter 95/1	-0.143	0.139	0.008	0.141
Quarter 95/2	-0.583	0.122	0.027	0.131
Quarter 95/3	-1.236	0.290	0.042	0.053
Constant	-0.862	0.108		

Notes: (i) See notes of Table 25. (ii) Reference categories for dummy variables are: corporate firm, construction, no additional shareholder, quarter 94/4.

Table 55: Subsidisation Equation of Five-Year Firm Survival in East Germany

Subsidisation equation	Coefficient	Standard Error	Marginal Effect	Mean
Initial firm size	-0.060	0.014	-0.004	3.774
Manufacturing	0.113	0.145		
Wholesale trade	0.237	0.152		
Retail trade	0.055	0.109		
Hospitality	-0.395	0.178		
Communication/transportation	-0.045	0.193		
Finance/insurance/real estates/housing	-0.426	0.232		
Business rel. serv. incl. data processing	0.014	0.163		
Other services	-0.172	0.161		
One additional shareholder	0.357	0.141	0.024	0.182
Two additional shareholders	0.455	0.248	0.031	0.036
Three and more additional shareholders	0.729	0.320		
Quarter 93/4	-0.514	0.376	-0.034	0.141
Quarter 94/1	-0.301	0.526	-0.020	0.179
Quarter 94/2	-0.451	0.445	-0.030	0.181
Quarter 94/3	-0.144	0.183	-0.010	0.122
Quarter 95/1	0.107	0.557	0.007	0.120
Quarter 95/2	-0.448	0.224	-0.030	0.104
Quarter 95/3	-1.331	0.407	-0.083	0.043
Constant	-1.078	0.281		

Notes: (i) See notes of Table 26. (ii) Reference categories for dummy variables are: construction, no additional shareholder, quarter 94/4.

Table 56: Subsidisation Equation of One-Year Firm Survival in West Germany

Subsidisation equation	Coeffi-cient	Standard Error	Marginal Effect	Mean
U/V-ratio	0.017	0.008	-0.0001	3.737
Age of firm at first observation/100	-0.029	0.016	0.0002	2.365
Initial firm size	-0.060	0.017	0.0004	2.994
Non-corporate firm	0.474	0.139		
Trade enterprise/sole proprietorship	0.423	0.160		
Manufacturing	0.054	0.128		
Wholesale trade	-0.194	0.150		
Retail trade	-0.192	0.111		
Hospitality	-0.400	0.158		
Communication/transportation	-0.442	0.209		
Finance/insurance/real estates/housing	-0.332	0.190		
Data processing	0.231	0.182		
Business related services	0.063	0.141		
Other services	-0.510	0.178		
One additional shareholder	0.280	0.177	-0.002	0.221
Two additional shareholders	0.597	0.208	-0.004	0.050
Three and more additional shareholders	0.987	0.253	-0.006	0.021
Quarter 93/4	-0.669	0.156	0.004	0.123
Quarter 94/1	-0.237	0.152	0.001	0.112
Quarter 94/2	-0.389	0.125	0.002	0.173
Quarter 94/3	-0.534	0.178	0.003	0.073
Quarter 95/1	0.076	0.122	0.000	0.150
Quarter 95/2	-0.446	0.145	0.003	0.126
Quarter 95/3	-1.077	0.232	0.006	0.100
Constant	-1.582	0.190		

Notes: (i) See notes of Table 27. (ii) Reference categories for dummy variables are: corporate firm, construction, no additional shareholder, quarter 94/4.

Table 57: Subsidisation Equation of Two-Year Firm Survival in West Germany

Subsidisation equation	Coeffi-cient	Standard Error	Marginal Effect	Mean
U/V-ratio	0.021	0.008	0.001	3.721
Age of firm at first observation/100	-0.030	0.018	-0.001	2.399
Initial firm size	-0.061	0.017	-0.002	3.068
Non-corporate firm	0.464	0.145		
Trade enterprise/sole proprietorship	0.351	0.163		
Manufacturing	0.144	0.127		
Wholesale trade	-0.114	0.156		
Retail trade	-0.153	0.116		

Hospitality	-0.301	0.162		
Communication/transportation	-0.366	0.212		
Finance/insurance/real estates/housing	-0.496	0.227		
Data processing	0.266	0.184		
Business related services	0.074	0.147		
Other services	-0.576	0.204		
One additional shareholder	0.246	0.182	0.008	0.223
Two additional shareholders	0.580	0.215	0.018	0.051
Three and more additional shareholders	0.973	0.254	0.028	0.023
Quarter 93/4	-0.661	0.164	-0.022	0.123
Quarter 94/1	-0.228	0.138	-0.007	0.113
Quarter 94/2	-0.367	0.132	-0.012	0.174
Quarter 94/3	-0.503	0.194	-0.017	0.073
Quarter 95/1	0.089	0.119	0.003	0.150
Quarter 95/2	-0.460	0.145	-0.015	0.123
Quarter 95/3	-1.153	0.275	-0.040	0.099
Constant	-1.603	0.182		

Notes: (i) See notes of Table 28. (ii) Reference categories for dummy variables are: corporate firm, construction, no additional shareholder, quarter 94/4.

Table 58: Subsidisation Equation of Three-Year Firm Survival in West Germany

Subsidisation equation	Coefficient	Standard Error	Marginal Effect	Mean
U/V-ratio	0.020	0.008	0.003	3.775
Initial firm size	-0.058	0.017	-0.009	3.116
Non-corporate firm	0.477	0.147		
Trade enterprise/sole proprietorship	0.376	0.158		
Manufacturing	0.059	0.132		
Wholesale trade	-0.148	0.162		
Retail trade	-0.207	0.123		
Hospitality	-0.299	0.164		
Communication/transportation	-0.440	0.226		
Finance/insurance/real estates/housing	-0.521	0.227		
Data processing	0.187	0.196		
Business related services	0.040	0.148		
Other services	-0.717	0.216		
One additional shareholder	0.210	0.181	0.035	0.223
Two additional shareholders	0.520	0.219	0.085	0.052
Three and more additional shareholders	0.926	0.252	0.149	0.023
Quarter 93/4	-0.599	0.166	-0.097	0.126
Quarter 94/1	-0.191	0.145	-0.031	0.114
Quarter 94/2	-0.310	0.131	-0.051	0.177

Quarter 94/3	-0.392	0.215	-0.064	0.071
Quarter 95/1	0.182	0.118	0.030	0.146
Quarter 95/2	-0.443	0.152	-0.072	0.122
Quarter 95/3	-1.038	0.277	-0.163	0.095
Constant	-1.669	0.178		

Notes: (i) See notes of Table 29. (ii) Reference categories for dummy variables are: corporate firm, construction, no additional shareholder, quarter 94/4.

Table 59: Subsidisation Equation of Four-Year Firm Survival in West Germany

Subsidisation equation	Coefficient	Standard Error	Marginal Effect	Mean
U/V-ratio	0.019	0.011	-0.0001	3.577
Age of firm at first observation/100	-0.076	0.026	0.0002	2.286
Initial firm size	-0.047	0.017	0.0001	3.208
Non-corporate firm	0.482	0.143		
Trade enterprise/sole proprietorship	-0.003	0.111		
Derivative	0.755	0.365	-0.002	0.006
Quarter 93/4	-0.577	0.184	0.002	0.138
Quarter 94/1	-0.189	0.167	0.0005	0.119
Quarter 94/2	-0.350	0.152	0.001	0.181
Quarter 94/3	-0.449	0.206	0.001	0.075
Quarter 95/1	0.120	0.144	-0.0003	0.150
Quarter 95/2	-0.275	0.173	0.001	0.108
Quarter 95/3	-1.176	0.364	0.003	0.085
Constant	-1.388	0.145		

Notes: See notes of Table 30. (ii) Reference categories for dummy variables are: corporate firm, quarter 94/4.

Table 60: Subsidisation Equation of Five-Year Firm Survival in West Germany

Subsidisation equation	Coefficient	Standard Error	Marginal Effect	Mean
U/V-ratio	0.019	0.011	0.001	3.732
Initial firm size	-0.033	0.015	-0.001	3.058
Non-corporate firm	0.636	0.162		
Trade enterprise/sole proprietorship	0.227	0.115		
Quarter 93/4	-0.495	0.195	-0.012	0.167
Quarter 94/1	-0.016	0.185	-0.001	0.143
Quarter 94/2	-0.150	0.162	-0.004	0.216
Quarter 94/3	-0.342	0.206	-0.008	0.078
Quarter 95/1	0.412	0.164	0.017	0.122
Quarter 95/2 or 95/3	-0.493	0.201	-0.011	0.137
Constant	-1.863	0.143		

Notes: (i) See notes of Table 31. (ii) Reference categories for dummy variables are: corporate firm, quarter 94/4.

Table 61: Reduced Form Estimation of One-Year Firm Survival in East Germany

	Coeff-cient	Standard Error	Marginal Effect	Mean
Survival equation				
Bridging allowance	0.353	0.163	0.016	0.078
Initial firm size	-0.302	0.143	-0.018	0.343
Initial firm size squared	0.062	0.034	0.004	0.366
Non-corporate firm	-1.019	0.251	-0.129	0.117
Trade enterprise/sole proprietorship	-0.458	0.152	-0.024	0.702
Manufacturing	-0.192	0.135	-0.014	0.084
Wholesale trade	-0.335	0.137	-0.027	0.070
Retail trade	0.009	0.117	0.001	0.214
Hospitality	-0.017	0.145	-0.001	0.084
Communication/transportation	-0.085	0.161	-0.006	0.057
Finance/insurance/real estates/housing	0.276	0.194	0.013	0.076
Business rel. serv. incl. data processing	-0.002	0.152	-0.0001036	0.081
Other services	0.219	0.165	0.011	0.091
Schwerin	0.192	0.105	0.011	0.344
Berlin (East)	-0.017	0.132	-0.001	0.102
Pirna	0.247	0.130	0.013	0.189
Dessau	0.353	0.121	0.018	0.211
Derivative	0.178	0.282	0.009	0.016
Diversified	-0.182	0.096	-0.012	0.161
Networks	-0.233	0.088	-0.016	0.239
Female	-0.059	0.093	-0.004	0.211
25 $\leq$age < 30	0.211	0.157	0.011	0.110
30 $\leq$age < 35	0.057	0.150	0.003	0.129
35 $\leq$age < 40	0.124	0.158	0.007	0.116
40 $\leq$age < 45	0.188	0.161	0.010	0.109
45 $\leq$age < 50	0.429	0.204	0.018	0.066
50 $\leq$age < 55	-0.018	0.180	-0.001	0.056
55 $\leq$age < 84	0.089	0.236	0.005	0.028
Information on age is missing	0.418	0.142	0.022	0.321
Subsidisation equation				
U/V-ratio	-0.014	0.014	-0.001	3.338
Age of firm at first observation/100	0.063	0.017	0.004	3.291
One additional shareholder	0.680	0.261	0.028	0.171
Two additional shareholders	0.856	0.331	0.025	0.036
Three and more additional shareholders	0.000	0.346	0.000000495	0.009
Quarter 93/4	0.348	0.166	0.016	0.111
Quarter 94/1	0.331	0.146	0.016	0.150
Quarter 94/2	0.183	0.133	0.010	0.164
Quarter 94/3	0.130	0.145	0.007	0.117

Quarter 95/1	0.124	0.135	0.007	0.141
Quarter 95/2	0.143	0.134	0.008	0.146
Quarter 95/3	0.215	0.174	0.011	0.058
Constant	1.630	0.237		
Log likelihood		-680.105		
Full sample observations		4566		
Wald test		χ^2 (41)=120.440		

Notes: (i) FIML estimation of the univariate probit model, based on a regional sample of the ZFPS. (ii) Reference categories for dummy variables are: corporate firm, construction, other region, age < 25, no additional shareholder, quarter 94/4. (iii) Robust standard errors using Huber/White/Sandwich estimator of variance covariance matrix.

Table 62: Overall Firm Survival in East Germany

	Coefficient	Standard Error	Marginal Effect	Mean
Survival equation				
Bridging allowance	-0.539	0.499	-0.147	0.081
Initial firm size	-0.280	0.132	-0.059	0.330
Initial firm size squared	0.165	0.077	0.035	0.341
Initial firm size ^3	-0.022	0.009	-0.005	0.832
Manufacturing	0.356	0.077	0.058	0.081
Wholesale trade	0.060	0.077	0.002	0.074
Retail trade	0.045	0.055	0.005	0.218
Hospitality	-0.247	0.072	-0.041	0.088
Communication/transportation	-0.026	0.085	-0.008	0.056
Finance/insurance/real estates/housing	0.324	0.082	0.066	0.079
Business rel. serv. incl. data processing	0.222	0.076	0.038	0.079
Other services	0.264	0.074	0.056	0.093
Schwerin	0.245	0.055	0.049	0.332
Berlin (East)	0.359	0.072	0.062	0.107
Pirna	0.189	0.062	0.037	0.192
Dessau	0.521	0.062	0.090	0.215
Diversified	-0.144	0.051	-0.032	0.157
Networks	-0.274	0.045	-0.063	0.231
25 ≤age<30	0.159	0.087	0.031	0.109
30 ≤age<35	0.242	0.085	0.045	0.129
35 ≤age<40	0.307	0.089	0.055	0.112
40 ≤age<45	0.387	0.088	0.066	0.110
45 ≤age<50	0.355	0.100	0.060	0.063
50 ≤age<55	0.505	0.104	0.078	0.059
55 ≤age<84	0.276	0.127	0.049	0.028
Information on age is missing	0.363	0.077	0.070	0.324
Constant	-0.138	0.106		

Correlation	0.397	0.241		
Subsidisation equation				
Age of firm at first observation/100	-0.022	0.010	0.002	3.114
Initial Firm Size	-0.056	0.011	0.004	3.303
Non-corporate firm	0.154	0.112	-0.011	0.113
Trade enterprise/sole proprietorship	0.262	0.130	-0.019	0.715
Manufacturing	0.068	0.106		
Wholesale trade	0.148	0.108		
Retail trade	0.067	0.079		
Hospitality	-0.193	0.116		
Communication/transportation	0.026	0.125		
Finance/insurance/real estates/housing	-0.201	0.119		
Business rel. serv. incl. data processing	0.059	0.108		
Other services	-0.149	0.113		
One additional shareholder	0.466	0.152	-0.036	0.162
Two additional shareholders	0.657	0.181	-0.052	0.034
Three and more additional shareholders	0.507	0.304	-0.040	0.009
Quarter 93/4	-0.644	0.109	0.042	0.110
Quarter 94/1	-0.475	0.093	0.032	0.150
Quarter 94/2	-0.594	0.096	0.040	0.162
Quarter 94/3	-0.308	0.103	0.021	0.117
Quarter 95/1	-0.127	0.086	0.009	0.142
Quarter 95/2	-0.608	0.103	0.041	0.144
Quarter 95/3	-1.356	0.227	0.076	0.060
Constant	-1.104	0.151		
Log likelihood		-4,531.643		
Full sample of observations		5,076		
Wald test		$\chi^2(48)=444.52$		

Notes: (i) FIML estimation of the bivariate probit model, based on a regional sample of the ZFPS. (ii) Reference categories for dummy variables are: corporate firm, construction, other region, age < 25, no additional shareholder, quarter 94/4. (iii) Robust standard errors using Huber/White/Sandwich estimator of variance covariance matrix.

Table 63: Overall Firm Survival in West Germany

	Coeffi-cient	Standard Error	Marginal Effect	Mean
Survival equation				
Bridging allowance	-0.170	0.754	-0.049	0.042
Initial firm size/10	0.340	0.240	0.092	0.279
Initial firm size/10 squared	-0.402	0.237	-0.109	0.285
Initial firm size/10 ^3	0.140	0.069	0.038	0.935
Initial firm size/10 ^4	-0.012	0.005	-0.003	5.012

Non-corporate firm	-0.065	0.081	-0.032	0.087
Trade enterprise/sole proprietorship	-0.180	0.049	-0.061	0.621
Manufacturing	0.224	0.077	0.051	0.102
Wholesale trade	0.055	0.084	0.021	0.076
Retail trade	0.053	0.062	0.019	0.254
Hospitality	-0.224	0.076	-0.050	0.110
Communication/transportation	-0.091	0.094	-0.013	0.051
Finance/insurance/real estates/housing	0.138	0.093	0.044	0.063
Data processing	0.326	0.117	0.070	0.034
Business related services	0.001	0.084	-0.001	0.071
Other services	0.286	0.085	0.080	0.092
Bremen	0.192	0.080	0.048	0.108
Hannover	0.203	0.075	0.051	0.143
Kassel	0.260	0.084	0.063	0.090
Essen	0.245	0.086	0.060	0.083
Hof/Bayreuth	0.455	0.088	0.102	0.082
Bad Kreuznach/Mainz	0.293	0.074	0.072	0.159
Deggendorf/Landshut	0.237	0.079	0.059	0.110
Göppingen	0.358	0.079	0.085	0.127
Networks	-0.246	0.058	-0.072	0.117
Start-up cohort of 1993	0.003	0.062	0.001	0.122
Start-up cohort of 1995	0.096	0.040	0.026	0.384
Constant	0.319	0.106		
Correlation	0.142	0.344		
Subsidisation equation				
U/V-ratio	0.022	0.008	-0.001	3.725
Age of firm at first observation/100	-0.029	0.013	0.001	2.112
Initial firm size	-0.053	0.016	0.002	2.785
Non-corporate firm	0.399	0.132		
Trade enterprise/sole proprietorship	0.409	0.150		
Manufacturing	0.141	0.127		
Wholesale trade	-0.195	0.142		
Retail trade	-0.160	0.107		
Hospitality	-0.386	0.141		
Communication/transportation	-0.344	0.184		
Finance/insurance/real estates/housing	-0.295	0.172		
Data processing	0.221	0.159		
Business related services	0.053	0.140		
Other services	-0.401	0.159		
One additional shareholder	0.303	0.166	-0.010	0.204
Two additional shareholders	0.579	0.198	-0.020	0.043
Three and more additional shareholders	0.920	0.246	-0.031	0.019

Quarter 93/4	-0.773	0.152	0.026	0.122
Quarter 94/1	-0.282	0.122	0.009	0.108
Quarter 94/2	-0.404	0.115	0.014	0.171
Quarter 94/3	-0.483	0.148	0.016	0.075
Quarter 95/1	-0.015	0.107	0.000	0.154
Quarter 95/2	-0.495	0.134	0.017	0.128
Quarter 95/3	-1.052	0.208	0.035	0.102
Constant	-1.620	0.173		
Log likelihood		-3,951.604		
Full sample observations		5,286		
Wald test		$\chi^2(51)=305.28$		

Notes: (i) FIML estimation of the bivariate probit model, based on a regional sample of the ZFPS. (ii) Reference categories for dummy variables are: corporate firm, construction, other region, cohort of 1994, no additional shareholder, quarter 94/4. (iii) Robust standard errors using Huber/White/Sandwich estimator of variance covariance matrix.

Table 64: Three-Year Firm Survival in West Germany Including Age of Firm at First Observation

	Coeffi-cient	Standard Error	Marginal Effect	Mean
Survival equation				
Bridging allowance	0.674	0.865	0.217	0.042
Initial firm size/10	1.323	0.350	0.468	0.312
Initial firm size/10 squared	-1.396	0.398	-0.533	0.359
Initial firm size/10 ^3	0.448	0.136	0.171	1.247
Initial firm size/10 ^4	-0.036	0.012	-0.014	6.883
Non-corporate firm	-0.262	0.110	-0.073	0.081
Trade enterprise/sole proprietorship	-0.449	0.061	-0.147	0.571
Manufacturing	0.168	0.096	0.068	0.114
Wholesale trade	0.021	0.103	0.000	0.077
Retail trade	0.142	0.080	0.042	0.242
Hospitality	-0.462	0.097	-0.203	0.093
Communication/transportation	-0.170	0.115	-0.096	0.054
Finance/insurance/real estates/housing	0.204	0.124	0.046	0.062
Data processing	0.191	0.149	0.082	0.033
Business related services	-0.027	0.104	-0.006	0.075
Other services	0.331	0.114	0.081	0.089
Bremen	0.331	0.102	0.119	0.113
Hannover	0.405	0.096	0.144	0.142
Kassel	0.284	0.104	0.103	0.092
Essen	0.260	0.110	0.095	0.077
Hof/Bayreuth	0.670	0.114	0.220	0.084
Bad Kreuznach/Mainz	0.244	0.091	0.090	0.157

Deggendorf/Landshut	0.359	0.101	0.129	0.113
Göppingen	0.415	0.100	0.147	0.128
Networks	-0.242	0.071	-0.095	0.130
Female	-0.121	0.057	-0.047	0.224
Start-up cohort of 1993	0.137	0.080	0.051	0.126
Start-up cohort of 1995	-0.085	0.051	-0.033	0.363
Constant	0.497	0.137		
Correlation	-0.189	0.438		
Subsidisation equation				
U/V-ratio	0.021	0.009	0.001	3.775
Age of firm at first observation/100	-0.025	0.020	-0.002	2.399
Initial firm size	-0.578	0.171	-0.004	3.116
Non-corporate firm	0.454	0.148		
Trade enterprise/sole proprietorship	0.340	0.164		
Manufacturing	0.090	0.135		
Wholesale trade	-0.133	0.163		
Retail trade	-0.185	0.126		
Hospitality	-0.293	0.166		
Communication/transportation	-0.436	0.229		
Finance/insurance/real estates/housing	-0.478	0.234		
Data processing	0.206	0.198		
Business related services	0.069	0.152		
Other services	-0.664	0.229		
One additional shareholder	0.218	0.183	0.014	0.223
Two additional shareholders	0.517	0.220	0.032	0.052
Three and more additional shareholders	0.936	0.261	0.055	0.023
Quarter 93/4	-0.601	0.167	-0.039	0.126
Quarter 94/1	-0.216	0.149	-0.014	0.114
Quarter 94/2	-0.310	0.134	-0.020	0.177
Quarter 94/3	-0.453	0.218	-0.029	0.071
Quarter 95/1	0.177	0.121	0.011	0.146
Quarter 95/2	-0.442	0.155	-0.029	0.122
Quarter 95/3	-1.055	0.277	-0.070	0.095
Constant	-1.616	0.183		
Log likelihood		-2,472.161		
Full sample observations		3,709		
Wald test		$\chi^2(52)=403.06$		

Notes: (i) FIML estimation of the bivariate probit model, based on a regional sample of the ZFPS. (ii) Reference categories for dummy variables are: corporate firm, construction, other region, cohort of 1994, no additional shareholder, quarter 94/4. (iii) Robust standard errors using Huber/White/Sandwich estimator of variance covariance matrix.

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